AAF REVIEW

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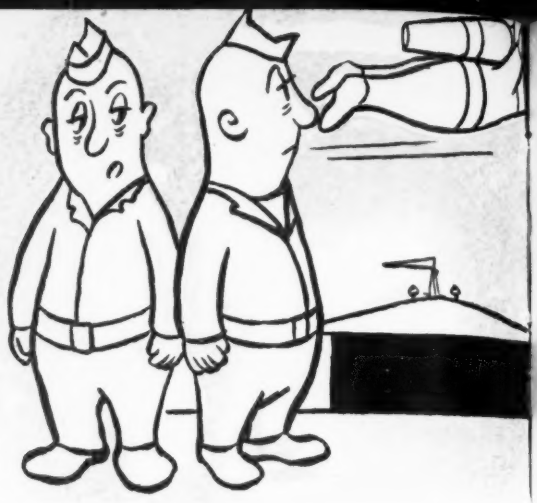

"Pay no attention to him, he thinks he's a genius."

"Don't you think you're taking this promotion to 'chief' too literally, Rimson?"

AAF SKETCH BOOK

by Cpl. P. Plasencia
AAF REVIEW Staff

"I love being driven home, don't you Ed?"

"Nice friendly dog you've got there, sir."

"Philip Krumple, I thought I t
you I never wanted to see you ag

Intercom

Knots, Knots, Nuts

Dear Editor:

On Page 2 of your issue of May, 1946, I note a letter from Lt. Richard C. Neidinger, addressed to the Editor of AIR FORCE, headed "Knots, or Knots per Hour?" The heading is noted but you do not seem to correct the letter, in that when speed is specified in "knots," it should be in "knots" and not "knots per hour," as originally the speed of a boat was determined by tying a piece of wood on the end of a string in which knots were tied every so many feet and then counting the knots which went through one's hand, in a given time. Therefore, I think you will find it should be specified as "200 knots" and not "200 knots per hour" as in Lieutenant Neidinger's letter. This is quite a common mistake which I believe should be corrected.

Charles Hollerith
Jackson, Mich.

Dear Editor:

May I refer the Lieutenant to TM1-205, Air Navigation, page 52 paragraph 40, which reads in part:

"Knots and miles per hour—a. Definition—A knot is a unit of speed equal to 1 nautical mile per hour. (It is equivalent to 1.15 statute miles per hour.) It is frequently used by navigators of airplanes which have a crew member designated as such. The word "knot" is complete without the additional words "per hour," per example, 120 knots is the same as 120 nautical miles per hour."

R. G. Jeffery
New York, N. Y.

Dear Editor:

Please let's get this "knots" and "knots per hour" business straight. When I went through navigation school we were taught that a nautical mile was 6,080 feet, and that a "knot" was a nautical mile per hour." Also, we were taught that it was wrong and ill-mannered to use the phrase "knots per hour." That's the same as saying "miles per hour per hour." If the Lieutenant will check his navigation training manual, I believe he will find he is wrong in his terminology, as referred to in a recent letter to "AIR FORCE."

M/Sgt. Earl R. Roberts
Sq. H, 3706th AAFBU
Sheppard Field, Tex.

Pacific Bomb Groups

Dear Editor:

Kindly send the following information if possible. I would like to secure a list of all the groups (service and bombardment) that were part of the 73rd Bombardment Wing, 20th Air Force (APO 237 and 244), on Saipan, Marianas Islands, from 14 September 1944 to 14 June 1945. Also, I would like to have a list of the groups that were part of the 7th Bomber Command (F/E), 7th Air Force (APO 244

Vol. 29 No. 6 July, 1946

AAF REVIEW

THE OFFICIAL SERVICE JOURNAL OF THE U. S. ARMY AIR FORCES

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Intercom

(Continued from Page 1)

Saipan) from 4 September 1944 to 14 September '44.

S/Sgt. Joseph W. McDaniel
Box 252
Dillon, S. C.

Write to the Adjutant General's Office, Organization and Directory Service, Operations Branch, Room 1C882, The Pentagon, Washington 25, D. C. Atten: Mr. Ross.

AAF Photos

Dear Editor:

During one year's convalescence at Valley Forge General Hospital I found a great deal of amusement, information and help in copies of the AIR FORCE SERVICE JOURNAL. The February number was especially good.

Having been a member of the 95th Bomb Group with the 8th Air Force overseas, I am especially anxious to find pictures of the 17s in action—formations, targets, bomb damage, etc. Will you help me by giving me an address where I may write to obtain such pictures, either by buying same or as a gift from some branch of the Air Force?

1st Lt. R. L. Jackson
Box 97
Hartland, Vt.

Lieutenant Jackson should write to the AAF Photographic Library, The Pentagon, Washington 25, D. C. for official AAF photographs.

Form 5s

Dear Editor:

Would you please send me as soon as possible the address to which I may write for a copy of my Form 5?

Marshall McKew
School St.
Troy, N. H.

Write to: AAF Flying Safety Service, Langley Field, Va.

How Sharp are YOU?

This photo shows mechanics of the 73rd Bomb Wing on Saipan loading and inspecting a B-29 and adding a few personal notes to 2,000-pound bombs being readied for a mission over Japan. Look at the picture for a full 60 seconds, remembering as many details as you can, then turn to Page 34 for a list of 10 questions. With a score of 10 for each correct answer, a total of 70 is fair, 80 good, 90 excellent and 100 sharp as a tack.

Intercom

Travel on Government Aircraft

Dear Editor:

I would like to know if there is any provision for an inactive member of the Officers Reserve Corps to travel on a government-owned or operated plane. If there is a provision made, I would also like to know from whom the booking for passage is obtained. Your assistance in this matter will be greatly appreciated.

Lt. Kenneth M. Fisher
Operations Hotel
Kelly Field, Texas

It is not authorized at this time. A staff study is being made on possible revision of AR 95-90 to allow this type of travel by Reserve Officers under certain conditions.

Discharge Pin

Dear Editor:

In your reply to Mr. Ross (REDEZVOUS, May 1946), you state that no discharge emblem has been authorized for former members of the AAF.

I believe he was referring to the small set of wings issued by the AAF upon discharge. I would like to know just what these are intended for, if they are not, unofficially at least, discharge emblem.

Tedford Dees
1365 Corona St.
Denver 3, Colo.

The Secretary of War has disapproved the issue of this pin. The decision is based on the belief that there should be one discharge button.

More Knots

Dear Editor:

A knot is a measure of speed not distance, and is defined as one nautical mile per hour. Since a knot is a measure of speed and not distance it is an error to speak of a speed as 200 knots per hour. Truly this is an acceleration or 200 nautical miles per hour per hour. Right?

Lt. Comdr. William E. Chapline
Coast Guard Air Station
St. Petersburg, Fla.

Roger!

PICTURE CREDITS

Cover: Lockheed Aircraft Corp.; Pages 14, 15, 16: NACA; Page 16: Cornell Aeronautical Laboratory; Page 35: Cornell Aeronautical Laboratory.

All other photographs in this issue were secured through official Army Air Forces and Signal Corps sources. Requests for prints and photographs for official use and publication should be directed to the AAF Photographic Library, Headquarters, AAF, Washington 25, D. C. All other requests must be forwarded to the original source.

THIS MONTH

The P-80 Shooting Star pictured on the front cover this month is the same type of jet fighter that literally "stole" the flight exhibition part of the National Press Conference held at Dayton, O., last month, during which three international speed records were established by the AAF.

Covering the conference for the AAF REVIEW were Lt. C. R. Hart and Sgt. T. Strong Menkel, co-authors of the article, "Curtain Raiser," on Page 22. An equally important part of the conference was the establishment of the three new records, bringing to 20 the official total now held by the AAF. These are listed in Sergeant Menkel's article, "Speed Records," on Page 30.

Lieutenant Hart is a veteran of 68 missions as a B-24 pilot in the Pacific and is now AAF REVIEW staff representative at Wright Field. A newcomer to the staff, Sergeant Menkel was formerly editor of the Lowry Field station newspaper, the "Rev-Meter," and before entering the Army was associated with the Scripps-Howard newspapers for eight years and with an industrial public relations firm for five. He has published a number of short stories and articles in national magazines, and recently completed his first novel.

☆

Behind the razzle-dazzle of transonic and supersonic aircraft, researchers work steadily without fanfare, as explained in the article, "Supersonic Wind Tunnels," on Page 14, by Sgt. Vivian L. Schectman. Also a newcomer to the staff, Sergeant Schectman came to the REVIEW from the public relations office at Wright Field.

In civilian life the sergeant wrote advertising copy for newspapers and magazines, did magazine editorial work in California and free-lanced on the side.

☆

"Attacking the Sonic Barrier," on Page 28, is the work of Capt. H. P. Andersen, Managing Editor of the REVIEW, a former B-17 pilot and prisoner of war for 24 months. Captain Andersen parachuted into occupied France in 1943 after an unescorted raid on the Lorient sub pens. He visited Wright Field air scientists for the data contained in his article. Before enlisting in the AAF, Captain Andersen was a magazine editor and news reporter. He joined the staff in March from a PRO assignment in the Training Command.

☆

Out of the yellowing pages of early Army air history comes the article, "Air Force's Oldest," on Page 17. Written by Maj. Charles P. Beazley, Editorial Director of the REVIEW, it is the story of the First Fighter Group, oldest US air combat unit which won 17 battle stars in two World Wars and counted among its early members many of the Air Force leaders of today.

Himself a member of this Group, Major Beazley drew heavily for his material from journals, diaries and mission reports while the outfit was stationed at Lake Lesina, Italy in the summer of 1945. He was on the Group's staff at the time, and the original sketch was used as the basis for radio manuscripts recorded in Rome and later sent to the States.

After his assignment to the REVIEW last winter, Major Beazley revised the material he brought back with him from Italy in December, and in addition interviewed Capt. Edward V. Rickenbacker, ace of War I, for data about air fighting in the early days.

☆

On Page 7 of this issue appears the tribute paid to the late Maj. Richard Ira Bong, top all-time American ace, by General George C. Kenney, Commanding General, Strategic Air Command, in a dedicatory ceremony held in Madison, Wis.

Announcement of the AAF's new and far-reaching educational program with the opening in September at Maxwell Field, Ala., of the Air University is also made this month by Maj. Gen. David M. Schlatter, Deputy Commanding General of the University. In the article, "Air University," on Page 9, General Schlatter explains objectives of the program.

Brig. Gen. Malcolm C. Grow, the Air Surgeon, Headquarters Army Air Forces, writes on Page 8, in the article "Hydraulic Leg," of an amazing new prosthetic development of the AAF which promises new horizons in the difficult task of rehabilitating veterans who have lost an arm or leg.

ANNOUNCEMENT

With this issue the **AAF REVIEW** supersedes AIR FORCE as the Official Service Journal of the U. S. Army Air Force.

At each AAF installation, the public relations office will be responsible for distribution.

Hereafter, AIR FORCE will be published as the official magazine of the Air Force Association, the organization knitting together all present and former members of the Army Air Force. Membership in the AFA, whose Headquarters are at 1603 K St., N. W., Washington, D. C., includes a subscription to AIR FORCE.

PROJECT RUBY

BOMBS STILL FALL IN EUROPE AS AAF AND RAF HOLD 'PENETRATION' TESTS OVER NAZI SUBMARINE PENS

BY CAPT. PHILIP SANTRY
AAF Review *Staff*

On the northern coast of Germany near Bremen nearly a year after V-E Day, the crashing explosions of bombs resounded over the apparently peaceful German landscape. Because the end of the war left both the RAF and the AAF with many unanswered questions regarding the effectiveness of bombs against installations specially constructed to withstand the impact of the most powerful missiles, both organizations decided to test the effectiveness of these structures.

At Farge, near Bremen, and at Heligoland Bight are submarine pens designed as invulnerable hiding places for Hitler's modern and vicious U-Boats which were to be used in a final, all-out assault against Allied shipping along the vital supply line to the ETO. The strongest of medieval fortresses appear weak as a doll house beside these colossal structures. Unlike the castles of the Middle Ages whose thick walls were designed to withstand the horizontal impact of cannonball and catapult, a sub pen's strongest resistance is against vertical attack from the air. This was the German answer to the smashing of their vital installations by Allied air power.

Never in the history of the world have structures of such strength been made especially to resist air attack. They are constructed of molded concrete block with the immense test strength of 500 kg. per cubic centimeter—material 10 times stronger than that used by the ordinary building contractor. Roofs are from 14 to 24 feet thick and are criss-crossed by arcs of spring-like steel making monoliths so resilient and tough that bombs bounced off instead of penetrating. The pens were also a difficult target. The outside dimensions of the Farge pen, for example, are 1,320 feet long, 300 feet wide and 75 feet high—seemingly huge for a building—and yet from 20,000 feet, as a single target, this was a small mark for the bombardier.

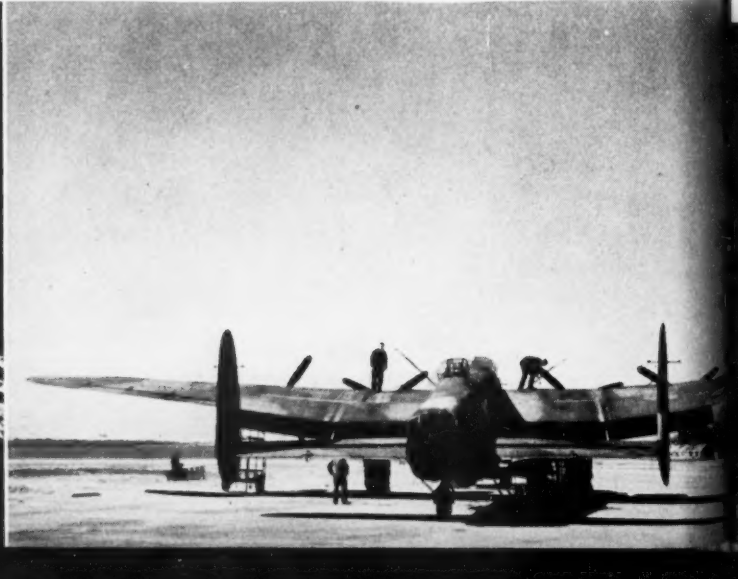
Examination of this structure after the cessation of hostilities showed that it had sustained no functional damage during a number of bombings. The RAF decided the building was ideal for use in tests to determine the penetration power and destructive abilities of all known types of bombs when used against a structure specially designed to resist air attack. However, Farge is in the American Occupation Zone and Heligoland was in the English Zone, so the RAF sought permission from the US to use Farge as this was the better of the two targets.

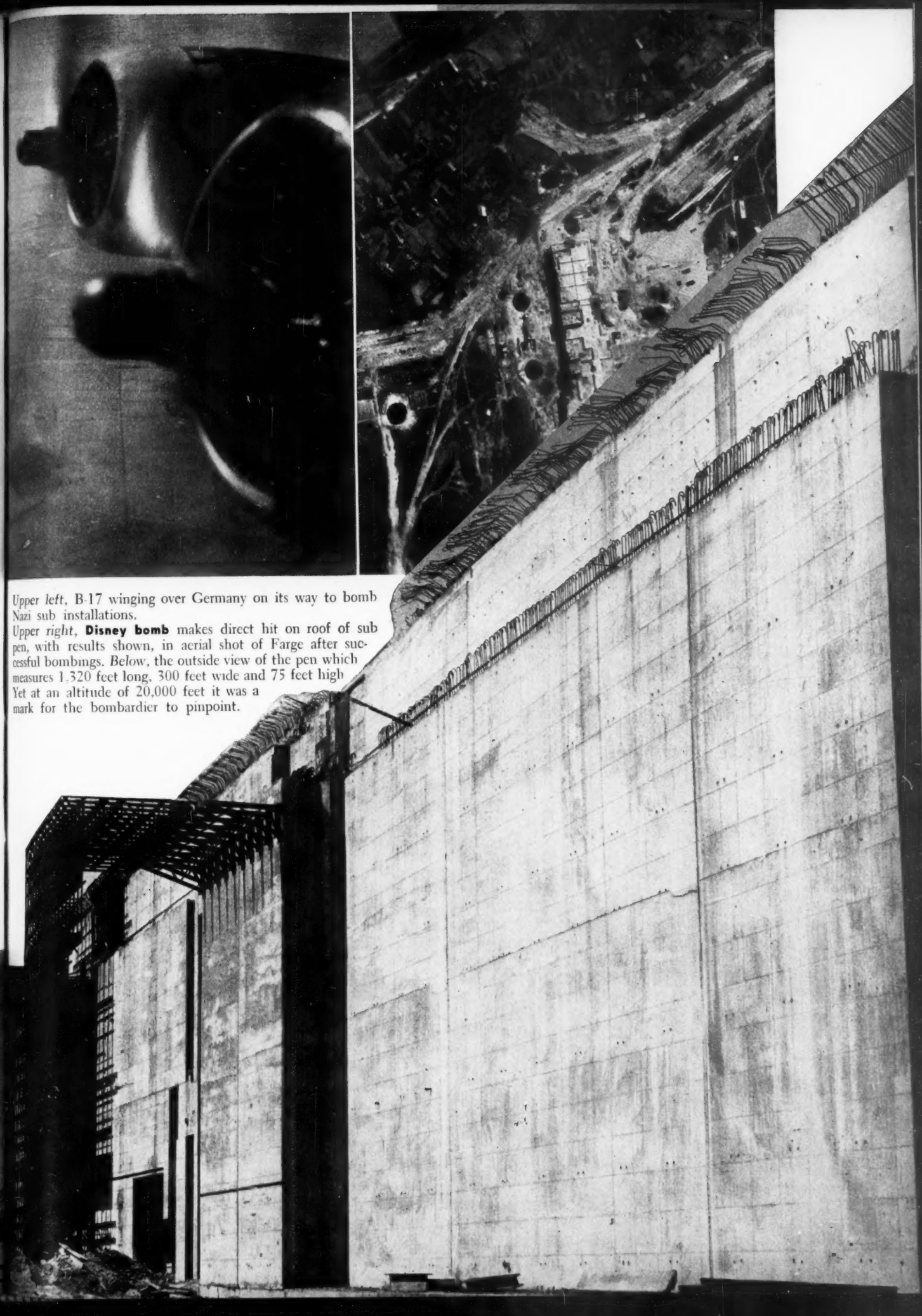
The AAF, immediately interested, asked the British if cooperative action would be welcome. The RAF replied affirmatively, so last September a group of American officers went to England to organize an AAF unit to carry out our part of the over-all program.

Interest ran high in the American unit. We enlarged the program, included more bombs, added AAF types to those of the RAF and decided on more objectives to be tested.

After the Air Ministry had agreed on AAF participation, we went to USAFE and told them of the project. We asked for three B-17s with air crews and maintenance crews, and put them on temporary duty at Mildenhall, Suffolk,

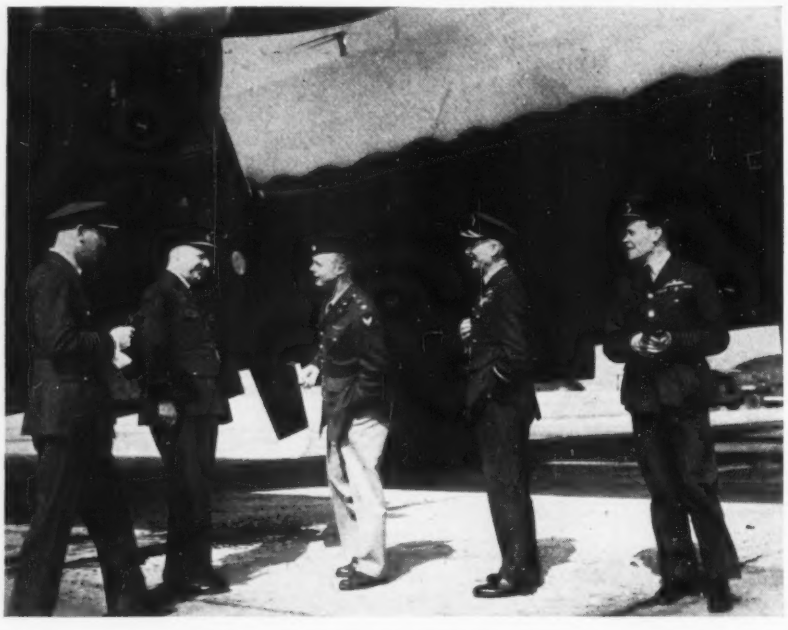
Bombardier sets up intricate bombinb mechanisms in Flying Fortress in preparation for the peace time bombing missions over previously invulnerable submarine pens in Germany. *At right* Royal Air Force maintenance crews ready a Lancaster Bomber for British participation in the joint project in which effectiveness of various types of bombs was tested.





Upper *left*, B-17 winging over Germany on its way to bomb Nazi sub installations.
Upper *right*, **Disney bomb** makes direct hit on roof of sub pen, with results shown, in aerial shot of Farge after successful bombings. *Below*, the outside view of the pen which measures 1,320 feet long, 300 feet wide and 75 feet high Yet at an altitude of 20,000 feet it was a mark for the bombardier to pinpoint.

the project's original air base. Crews assigned were low in point scores and relatively inexperienced in bombing, so practice missions were organized. Bombs were limited and costs were high. Since no maintenance crews were assigned, maintenance was done at nearby AAF installations. The project struggled along under difficulties of lack of personnel and supply until redeployment hit a bitter blow. The nearby AAF installations were de-activated and moved out, leaving the project without maintenance or supply channels. At this point Col. G. L. Robinson, the CO, went to USAFE and advised the project was at a standstill because of lack of maintenance personnel and supply. He was informed that the theater command would be unable to furnish such services but USAFE suggested that the unit return to the States and organize a self-sustaining outfit, independent of any other AAF organization, complete with its own supplies, maintenance and technical personnel.



RAF officers with Project Ruby and Lt. Col. D. G. Hawes (center) who activated the AAF unit in the United States discuss results of bombs and technique employed against the structure which was specially designed to withstand bombing raids. Close coordination between the two groups resulted in successful tests.

Back in the States this independent unit was organized and activated under Lt. Col. D. G. Hawes, and was designated Project Ruby. Three B-29s and six B-17s were assigned to the project, complete with adequate and skilled aircrews, maintenance and supply personnel. Objectives were reviewed and redrafted. The final organization of the project was completed at the Eglin Field Proving Ground Command. Fifty officers and 100 enlisted men, all carefully selected specialists, were moved from Eglin Field to Marham Air Base, East Anglia, England. The three B-29s and four B-17s, complete with their aircrews and many of the necessary supplies, flew to England over the "scenic" southern route from West Palm Beach to Borinquen Field, Georgetown, British Guiana, Belem, Natal, Dakar, and Casablanca. This southern route was necessary because the B-17s had no de-icing equipment. From Casablanca the B-29s went to Burtonwood, England. The B-17s, with shorter cruising range, went to Paris and then to England. Finally the whole group was brought together at Marham air base in East Anglia. The entire trip had covered 8,860 miles without an accident.

Now the program began in earnest. RAF Lancasters and AAF B-17s and B-29s lugged a wide assortment of bombs over the previously invulnerable targets at Farge and Heligoland. The pattern of the whole project became apparent. Unlike any obtainable situation in the war, bombardiers, ballistic experts, aircrewmen and scientists alike could visit the target on foot after a bombing to observe at close range, the results of the latest hits.

The reasons for previous lack of success in attacking targets of this type soon were apparent. Even the heaviest of bombs—22,000 pound "Grand Slams," and 12,000-pound "Tall Boys"—were being shattered on the roofs of the submarine pens as if dropped on a solid granite mountain. A ruptured bomb has neither penetration ability nor explosive power since a bomb depends for its blast effect upon the confinement of the charge by its heavy steel case. Clearly, mere weight and explosive force were not enough to accomplish the desired penetration. Obviously if complete penetration could not be obtained, the explosion of the bomb would take place outside the structure with greatly decreased force.

A new technique and a different bomb had to be devised. New type bombs with armored heads and high-powered rocket assistance were brought into the test. Calculations of the velocities obtained in dropping various bombs from various heights were made by experts and scientists, and the conclusion was drawn that penetration could be obtained only if the bomb struck the roof at a velocity in excess of 1,150 feet per second. Such transonic velocities also caused unusual behavior of bombs in flight because of compressibility effects. Also, the problem remained to develop a bomb which would not only penetrate the roof but delay its explosion sufficiently to effect complete destruction of any contents of the pen.

A new AAF bomb, the "Amazon," is under development and will shortly be made available to Project Ruby. This bomb weighs 22,000 lbs., the same as the RAF's Grand Slam, heaviest bomb used during the last war. It will combine great weight and an immensely strong case which are expected to result in puncturing the roofs of the test structures and producing a delayed explosion of terrific blast strength, sufficient to destroy any living or inanimate thing inside the pen.

During the several months Project Ruby has been in progress, careful records have been kept of the number of bombs dropped per mission, the types of bombs, the velocity reached at impact, the percentage of hits scored, the effect of the drop on the bomb itself and most important, the extent and type of damage obtained on the structure. All of this activity, including the documentation of records, was the result of painstaking care.

The AAF has scored a high percentage of hits, approximately 62 percent to date. But the percentage of pentrating and completely successful hits remained small until rocket-assisted, armor piercing bombs of the "Disney" type were used. Many details of the Disney bomb are still secret.

In general it is a long, slender bomb weighing 4,500 pounds, with an armor piercing head, and in its tail a large

(*Continued on Page 43*)

DICK BONG

A Tribute To the Memory of the AAF's World War II Leading Ace by His General

By GENERAL GEORGE C. KENNEY

At a dedicatory ceremony in Madison, Wis., May 30, 1946 where a life mask of the World War II Ace was unveiled, General Kenney eulogized Major Bong as follows:

Maj. Richard Ira Bong, United States Air Force, veteran of the Pacific War, ruled the air from New Guinea to the Philippines. He was officially credited with the destruction in combat of 40 enemy aircraft, the top all-time score for any American aviator, and awarded every decoration the United States can give a combat flyer.

The story of Dick Bong is part of America's history. It is the story of America, the story of American youth. The pages of our histories are full of these stories. Born in a small town, educated in its schools, working between school terms on his father's farm—a typical normal, healthy American boy.

In the fall of 1939 a trio of international gangsters launched an attack upon the civilized world. By 1941 it was clear that this country, our country, Dick Bong's country, was on the list of prospective conquests. Dick Bong volunteered as a flying cadet. A natural aviator, he quickly gained his wings.

In May 1942 he reported to me at Hamilton Field, Calif. as a fighter pilot. When I was ordered to Australia in July of that year to take over the command of the Allied Air Forces under General MacArthur, 2nd Lieut. Richard I. Bong was on a list of selected fighter pilots that I asked for. He arrived in Australia that September.

On December 28, 1942, I read a combat report which simply gave the time of take-off at Port Moresby, New Guinea, the time of arrival over Buna on the north coast, the fact that he had there shot down two enemy aircraft, and the time of landing back at his home field. For some unknown reason, I said, "Watch Bong—There is the ace of aces just starting to work."

I watched; we all watched that score build up. We watched the growing respect and admiration and affection of fellow pilots, mechanics, junior officers, and senior officers, all the way up to Douglas MacArthur himself. We listened to Dick Bong as he imparted to others the combat lessons that he had learned the hard way. We smiled when he modestly and sincerely complained that he was really a terrible shot and should be doing much better.

We saw his point of view when he resented a story about Bong the Killer. Of course he wasn't a killer. There was no hate in Dick Bong's make-up. We had a job to do. The Jap had to be defeated. Part of that job was shooting down Jap airplanes. Dick was simply doing his part.

In the fall of 1943 his score had reached 28 official victories, the greatest number ever credited to an American aviator up to that time. He had earned a rest; but his primary objective, which he earnestly explained to me, was to go to a gunnery school back in the United States and really learn how to shoot. He was now Captain Bong, a flight leader in the leading fighter squadron of the American Air Force. I sent him home. He took his gunnery course.

Eight months later he reported back to me in New Guinea with the news that he now really knew something about aerial gunnery. I said, "Dick, I want you to teach the rest of the fighter pilots what you know. You have done enough combat. Being an instructor may not appeal to you, but if you can impart to others what you have learned, you will save a lot of American lives and indirectly shoot down a lot of enemy aircraft."

Dick did the job. The count of our victories went up—and our losses went down. The efficiency of our fighter units became a by-word in the whole Air Force.

In spite of my remonstrances which I'm afraid were a bit weak at times, Dick occasionally went along on combat to see, as he naively expressed it, "whether the boys were really absorbing their lessons." Twelve times, according to his story told with a shy grin and a little twinkle in a pair of blue eyes, in self-defense he had been forced to shoot down enemy planes which had insisted on interfering with his observations.

It got to be an Air Force joke. Finally, in desperation, I asked General MacArthur personally to decorate Dick with the Congressional Medal of Honor on the airdrome at Tacloban, at Leyte, and I then sent him back home. It didn't seem to worry Dick, but the strain was getting us all down. Forty victories were enough, but more important, I did not want to lose Dick Bong. The whole Fifth Air Force did not want to lose him; General MacArthur did not want to lose him.

When in August 1945 the word was flashed to us that Maj. Richard I. Bong had made his final flight, all other events of the day were forgotten. A quarter of a million Americans, Australians and New Zealanders forgot about the atomic bomb, stopped speculating about the impending capitulation of Japan.

We were fiercely proud of Dick Bong. He would not boast, but we did, of the fact that the crews of 40 enemy airplanes had lost trying to dispute the mastery of the air with our Dick Bong. We had all sighed with relief when he went back safely to the United States.

You see, we loved him. We didn't want to lose him.☆

HYDRAULIC LEG

A new development in artificial legs permits simultaneous flexion of ankle and knee and is bringing new hope to amputees.

By Brig. Gen. Malcolm C. Grow
Air Surgeon

Many a man came home from the war without an arm or a leg—an amputee—struggling with a difficult task of readjustment to life.

As doctors we are dedicated to the task of rehabilitating these who gave so much. Our goal is to enable them to walk naturally and work naturally.

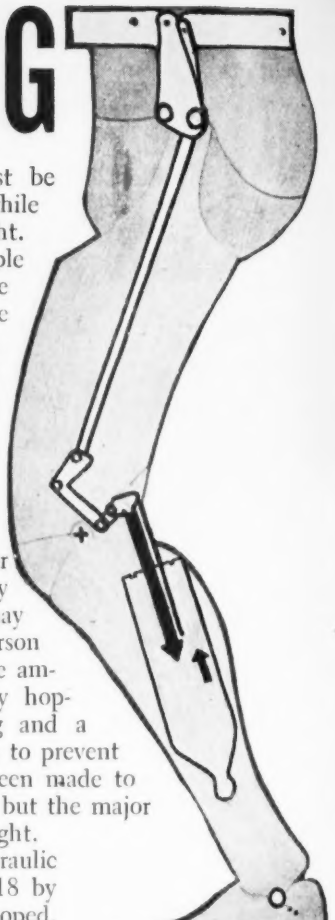
Their plight lends urgency to the search for perfect prostheses (artificial legs and arms). To the man hobbling along on crutches sympathy is not enough. What he wants is a leg the equivalent of the lost one! We are aware of the limitations of present prostheses which have been little improved since the models developed after the last war, and we are constantly seeking new ideas.

After V-E Day, while investigating the German research in aviation medicine, I came across two scientists, Ulrich K. Henschke and Hans A. Mauch, who had conceived the idea of using the hydraulic principle in artificial legs. Employed by the AAF at Heidelberg, they were encouraged to put aside their other research to concentrate on this new apparatus.

Henschke and Mauch successfully developed two devices: A small hydraulic system which can be installed in present-day artificial legs to control knee action, and a pair of rods to correlate the flexion of knee and ankle into one smooth stepping motion.

The normal human knee can do wonderful and varied things. The most important and frequent movements are in slow and rapid walking, hill climbing, and going up and down stairs. In normal walking the legs must be flexed and *fixed in flexion* in any one of a continuous series of angles. This is exemplified in ascending and descending stairs and in climbing hills. A second function of the normal leg is a slow and gradual flexion when it is bearing the body's weight. Thirdly, the normal knee is capable of extension, as in kicking a football, and it can be held in extension.

For standing on a leg with safety or walking with a natural stride and for ascending and descending stairs and inclines, the knee joint must be held at various angles while bearing the body's weight. This has so far been impossible with conventional legs. The present artificial leg must be held in a straight position while the amputee steps up to the next step, using his good leg.



Moreover, an amputee must beware even small ground obstacles because, if his foot accidently strikes a stone in walking, the older types of artificial legs may buckle under him. This may seem a trivial thing to a person with two good legs, but the amputee must arrest a fall by hopping on his one good leg and a double amputee has no way to prevent a tumble. Attempts have been made to use mechanical knee brakes but the major limitations are size and weight.

The idea of using a hydraulic system was suggested in 1918 by Windler but was not developed. With a light weight hydraulic system that can be installed in present hollow prostheses the knee joint can be fixed at any angle and, more important, the rate of flexion (as in a deep knee bend) can be controlled, even when the weight of the body is being borne by the artificial leg alone.

The advantages are obvious. The amputee can walk down stairs placing the artificial leg on a lower step while bearing his weight on the artificial leg; he can advance the normal leg to the next step instead of using the present clumsy and awkward one-legged method. Similarly, with the piston arrangement to lock his knee the amputee can climb stairs using alternate legs.

An obvious defect of present day artificial legs is the inability to control the ankle. As the artificial leg is swung back and forth in walking, the ankle remains at a 90° angle to the lower leg. To avoid scraping his toes the amputee raises his hip, creating a gait which is characteristic. It is highly desirable to combine knee flexion with ankle flexion.

Henschke and Mauch connected the knee and ankle by means of rods attached to the inner part of the lower leg, allowing a simultaneous flexion of ankle and knee. This simple device improves walking because it allows the toes to be lifted clear as the knee is bent with each step forward, obviating the necessity for raising the whole hip.

This "hydraulic leg" is on its way from Germany. It will be subjected to further tests and refinements by The Surgeon General, Major General Norman T. Kirk, at the Prosthetic Research Laboratory, Walter Reed General Hospital. I am sure our own American inventiveness will be stimulated by this new device, and, while the final form is as yet undetermined, better prostheses are coming. If they do not serve almost as well as a normal limb, they are not good enough. ☆

AIR UNIVERSITY

BY MAJ. GEN. DAVID M. SCHLATTER

Spurred by the necessity for keeping abreast of scientific advancements in aerial warfare, the Army Air Force in September will inaugurate a most far-reaching educational program—a milestone in military history.

At Maxwell Field, Ala., the Air University will receive the first of thousands of officer-students to be enrolled in the Air War College and the Air Command and Staff School. On the same date, September 3, other students will begin classes in the Special Staff School at Craig and Gunter Fields, also in Alabama, and later in the Air Tactical School at Tyndall Field, Fla. A fifth school, the AAF School of Aviation Medicine, now assigned to the Air University, will continue in operation at Randolph Field, Texas.

The need for an AAF educational system should be readily apparent. It might appear, after the AAF Training Command has thoroughly prepared soldiers to perform their various specialties and the young officers to assume the positions of pilot, bombardier, navigator or engineer, that the rest would be simply a matter of organization and employment. However, we were so highly successful in World War II because we were successful in three main, chronological phases, one of which necessarily predated the war by years.

First, the thinking on air power, the type of weapons, the type employment and the strategy of target selection had not only been accomplished between World War I and World War II, but more important, had been done correctly; in most cases, against opposition and pressure. For instance, our Air Force doctrine insisted on the long range heavy bomber and precision bombardment of enemy vital objectives as the most successful means of applying air power. This was opposed by people who thought of airpower only in terms of the Stuka bomber-panzer team.

The second phase, chronologically, was the miracle of American production; not only the production of heavy bombers and other machines of war, but of trained crews and supplies in overwhelming quantity. This would have been useless without relative success in phase one.

The third phase was the actual fighting, which was so superbly done by young Americans who can more than hold their own anywhere.

We are at present back at the first phase of the same chronological sequence. Our thinking on the future of airpower must be sound and must be oriented correctly, or the power of America will be misdirected. There is no finer tribute than that paid by Winston Churchill to the professional officers of the United States for their attainments in directing the organization and employment of the huge forces assembled and trained in such a phenomenally short time. He recognized the great need for continuous study in the skills and techniques of the military art.

We conceive of the future security of the United States as being a national problem, one in which the entire nation is primarily concerned with preserving peace. We cannot, therefore, conceive of an Air University system without close attention to the proposed educational structures of the Ground and Naval forces.

We have recommended a common or joint platform for the entire structure, feeling that the young American should first of all be indoctrinated in terms of national security before he specializes in any component or branch. From this nation-wide common pool are drawn the prospective officers for the Air Force who are fitted for their initial assignment in the AAF by the AAF Training Command. They are educated in subjects necessary and common to all officers, whether their basic specialty be pilot, engineer, communications officer or something else.

The educational systems of the major components comprise the uprights of the structure, which has a joint roof. The Armed Forces College, dealing with joint staff and command at the theater level, is followed by the National War College dealing with the highest executive direction of war on a national scale. The uprights or major component systems are cross-braced by exchange of selected students and by strong elements of joint instruction at each level.

In the Air Force Schools at all levels will appear a thorough appreciation of the organization, capabilities, limitations and operation of Ground and Naval Forces. The specific field of the Air University lies between the Training Command, which will continue to prepare officers for their initial assignment, and the joint colleges under direction of the Joint Chiefs of Staff.

Maj. Gen. M. S. Fairchild

The mission of the Air University as contained in AAF Reg. 20-61, briefly is to:

(1) Operate the

Air War College, the Air Command and Staff School, the Air Tactical School, the Special Staff School and the School of Aviation Medicine.

(2) Exercise broad supervision over the Air Institute of Technology.

(3) Make a continuous survey of the overall educational system, submitting appropriate plans and recommendations to Headquarters, AAF.

(4) Continuously survey and recommend civilian courses to round out the instruction offered by AAF Schools.

(5) Train, indoctrinate and supervise AAF instructors presenting Air Force instruction at non-AAF Schools.

(6) Review, revise and prepare Field Manuals and Staff Studies; to monitor tactical service tests; to review and evaluate tactics and techniques; to review and evaluate all anti-aircraft matters other than the strength required for air defense. In accomplishing these functions, it is contemplated that the Air University will act in the capacity of a monitoring agency or steering committee utilizing the expert knowledge available in all of the commands of the Air Force.

In order to accomplish the mission assigned, the Air University has developed certain basic doctrines to guide the development of various courses and duties of the staff. These doctrines advance the following principles:

(1) That the ultimate objective of airpower is to force the capitulation of an enemy nation by air action applied directly against the vital points of its national structure. (This may not at any given time be primary in importance, but it is the *ultimate* objective).

(2) That armed forces exist primarily to preserve peace.

(3) That all instruction and doctrines must be oriented on the future. It is contemplated that the struggle against conservatism and dogma which has heretofore been not too difficult for the Air Force will become increasingly so because now we have a great record of achievement which must not be allowed to cloud our view of the future.

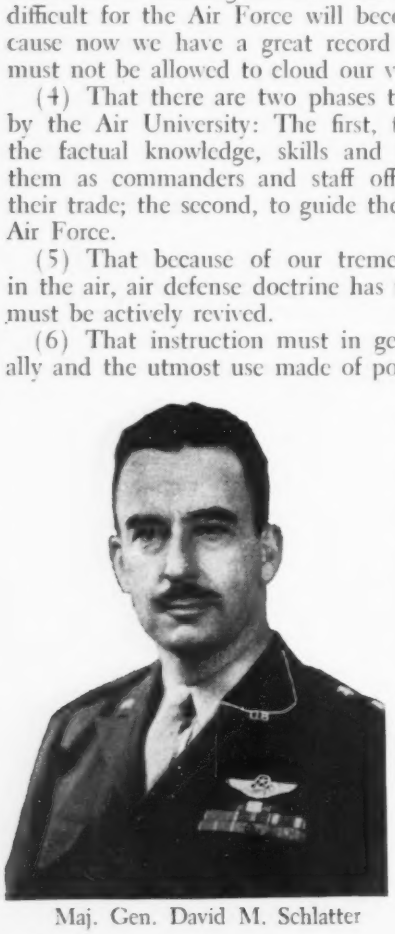
(4) That there are two phases to the education offered by the Air University: The first, to furnish officers with the factual knowledge, skills and techniques essential to them as commanders and staff officers, i.e., the tools of their trade; the second, to guide the future thinking of the Air Force.

(5) That because of our tremendous recent successes in the air, air defense doctrine has tended to stagnate, and must be actively revived.

(6) That instruction must in general be oriented globally and the utmost use made of polar projection maps.

(7) Because of the global character of airpower, breadth of view and broad fields of knowledge related to airpower are indicated in the various curricula

(8) That technical developments must be given continuous study and presentation to keep abreast of scientific developments and to project doctrines toward the future.



Maj. Gen. David M. Schlatter

Guided by the above requirements and necessary doctrines, the Air University has been organized in streamlined fashion. Headquarters is composed of three units. The Command Section, headed by the Commanding General, includes the Faculty Board, Air Inspector and Public Relations Officer. All administration is centered under a

Deputy for Administration with an appropriate staff. All education is consolidated under a Deputy for Education, including all schools of the Air University.

A unique feature of the organization is an Educational Services Division, headed by Dr. Kenneth R. Williams, formerly dean of education at the University of Georgia. This division, composed of 50 key civilian experts, will provide much of the "know-how" from a strictly educational standpoint. Combat-wise Air Force officers will furnish required knowledge of tactics and technique, and will bring a broad background of combat experience and knowledge to the platform. They are not, however, experts at education and educational research, at test construction or curricula arrangement, hence the need for this body of civilian experts to advise and instruct the instructors.

The Air Tactical School now being organized at Tyndall Field has the mission of preparing young officers for the command of squadrons and for staff duty comparable to the squadron grades. Here the major emphasis is on broadening, stimulating orientation designed to guide future thinking. It is expected that all junior officers with from one to four years of service will attend. Two courses of about four and one-half months each are planned yearly and it is expected to initiate the first class at Tyndall Field by January, 1947. Selection for attendance will undoubtedly be essential initially due to the tremendous number of officers whose education has been interrupted by the hard business of fighting the last five years. The course will stress the responsibilities of a squadron commander and comparable staff officers in leadership, tactics and techniques, intelligence, communications, administration, supply, personnel management, methods of instruction, public relations, civil affairs and new developments. The courses will be oriented primarily on the squadron, secondly on the group and the broadening subjects for orientation such as geo-politics, higher organization, Ground forces and Navy. Joint action will be such as to stimulate and lead up to the Air Command and Staff School. The curriculum has been designed by capable group commanders who have put into it what they felt they should have known during

this last war to lead a squadron successfully, or to function on a higher staff more efficiently.

The Air Command and Staff School at Maxwell Field has as its mission the preparation of officers with 4 to 12 years of service for the command of groups and wings and for staff duties comparable to those grades. In this school the emphasis will be about equally divided between teaching the necessary skills and techniques and the broadening phase designed to shape future thinking. The emphasis in the course will be on *how* to apply air power at the level of the group, the wing, and the air force, and on responsibilities of commanders. Orientation will be designed to lead more and more to careful thought on *why*, *when* and *where* to apply airpower. The students will be selected carefully from former graduates of the Air Tactical School and from officers whose wartime service is considered sufficient to exempt them from attendance at the Air Tactical School. The course will be approximately nine months long, starting on September 3 of this year with a maixmum class of about 200.

The Air Institute of Technology being organized at Wright Field, Ohio, by the Air Materiel Command, has as its mission providing instruction to assure scientific technological development of AAF equipment, and efficient operation of procurement, supply, maintenance and engineering responsibilities assigned to the AAF. Its level is about the same as both the Air Tactical School and the Command and Staff School on the technical side. Initially, emphasis will be given to develop young officers scientifically educated to act as links between the Air Force and the scientific world.

The Air Special Staff School has the mission of providing specialized instruction *not otherwise available* to prepare selected individual officers for specialized administrative and technical assignments on the staff of group and higher units. The Special Staff School will reopen its courses at Gunter Field, Montgomery, Ala., and Craig Field, near Selma, Ala , starting in September. The courses presently contemplated are air communications, public relations, senior intelligence, applied personnel management, maintenance management, senior officers' courses, advanced inspectors' course, general air inspectors' course and base commanders' course.

The School of Aviation Medicine, which has been operating for years at Randolph Field, will continue to do so under the over-all guidance of the Air University. At present, courses are being conducted for aviation medical examiners, aviation nurses, air evacuation, with a basic and advanced course for Air Force Medical Officers. Technical supervision will remain as heretofore with the Air Surgeon. The research and development program of the School of Aviation Medicine will continue to be of the utmost value.

The Air War College has the mission of preparing selected officers for the employment of major Air Force units to insure the most effective development of the AAF as a whole and to consider the broad aspects of airpower. We consider the Air War College in much the same light as Elihu Root conceived of the Army War College when it was initiated many years ago—as a deliberative agency of the AAF Staff whose primary function will be to consider and present solutions to broad problems affecting the Air Force. Selection for attendance at this college will eventually be from graduates of the Command and Staff School and at present will be confined to graduates of the prewar ACTS and officers whose broad experience and ability may be considered as the equivalent of attendance at the Command and Staff School. Some of the problems projected for study:

(a) Air defense of the United States.
(b) Coordination of airpower with surface operations.
(c) The import of atomic bombs in air strategy.
(d) Strategic and tactical evaluation of the European and Japanese Wars.

A continuous survey of the courses available in civilian institutions and numbers of officers to attend is required. Certain graduates of the Air Institute of Technology, for example, may need to pursue highly specialized postgraduate courses in nuclear physics and electronics. These courses are currently under study in Headquarters AAF, but the responsibility will be assumed by the Air University.

We feel that a system is being developed which will be adequate to the requirements of the future. We are going to insist that the system remain flexible to care for the changing needs of the future and yet remain firmly fixed on the platform of the present. Any officer selected to attend all the schools, including the joint Armed Forces College and National War College should complete his education by the time he has had 20 years of service, and earlier if possible. Such an officer will have attended schools for approximately five of these years. The average officer will attend schools for approximately two of his initial 20 years of service. We estimate that a maximum of 10 percent of our total officer strength will be on duty as student or instructor.

We feel that we have made fair progress in this first few months of organization and that we have a sound organization for future development. It is worthwhile to call attention to three new departures which have already been instituted and which we feel to be important forward-looking steps:

(1) This is the first time so far as we know that the major responsibility for education has been centralized under one headquarters without other diverting responsibilities.
(2) Realizing the deficiencies of the professional officer in the purely educational fields we have procured the best specialists possible from civilian universities for the Educational Services Division.
(3) General Spaatz has invited a number of the foremost civilian educators and heads of great universities to form a board of visitors to meet periodically to consider the Air University in its entirety, and from their wide experience to recommend changes and improvements. A most flattering unanimity of acceptance has resulted, and it is felt that not only will the advice of this important body of men be of the utmost value but they in turn will serve as a vital link between the AAF educational system and that of our nation.

Finally, the entire AAF is really a university, and the formal instruction presented in the Air University is simply the core or heart of the system. ☆

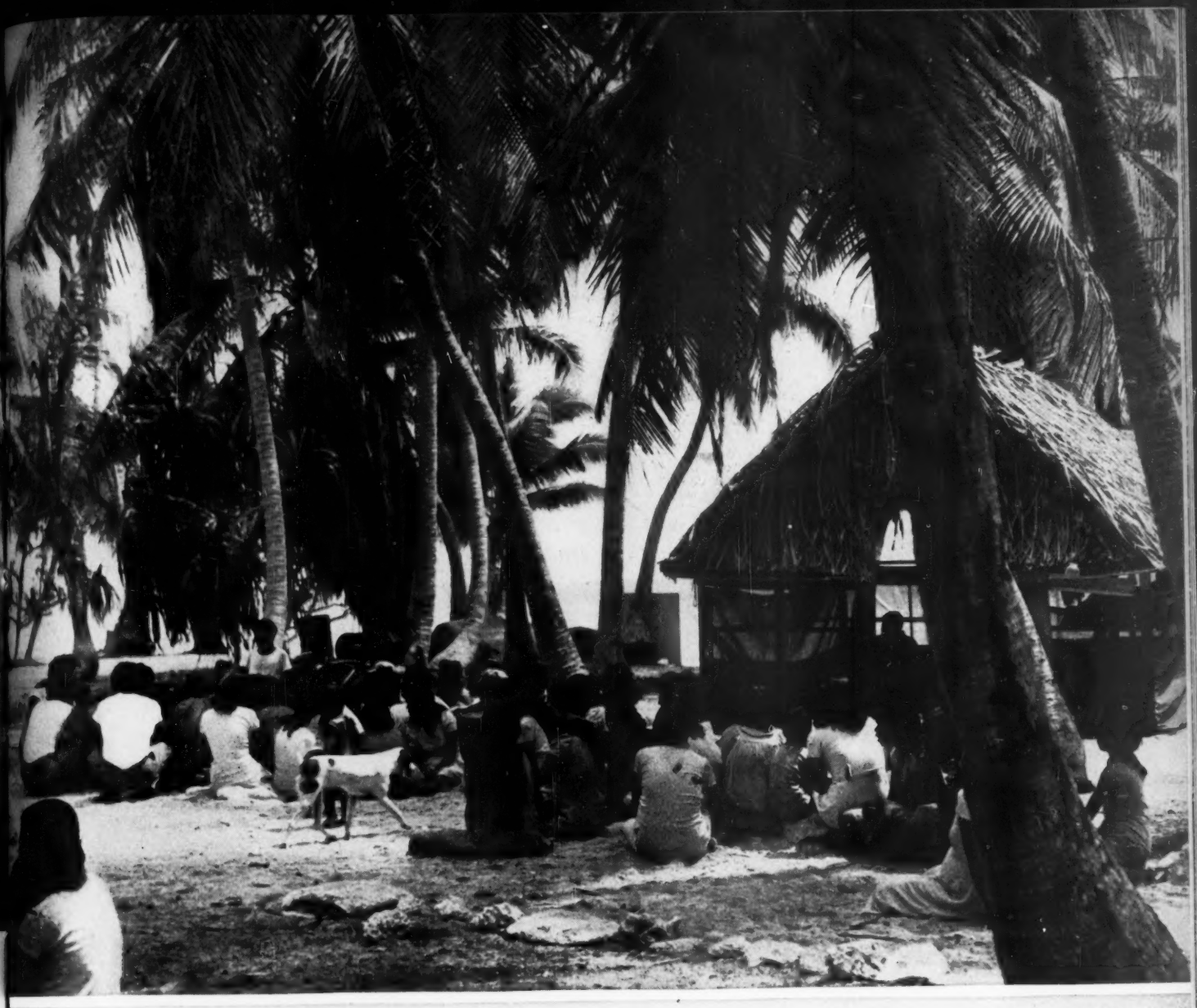
CROSSROADS CHAMPIONS

Atom bomber base at Kwajalein is a coral crescent. Opposite page, natives removed from Target Bikini and another view of Kwajalein.

When A-Day came to the Marshall Islands, a B-29 took off from Kwajalein and headed north over the open sea to Bikini and history. Aboard the Superfortress was the finest bombing crew ever selected. After months of rigid training and relentless competition for the coveted assignment, Maj. Woodrow Swancutt's crew received top honors. Tragedy had struck earlier, however. Dave Semple, the bombardier, one of the best in the AAF, was killed on a test mission. Then in story-book fashion two events took place which acted strongly in the crews favor—the postponement of the test to July 15 and the elimination of one of the other crews on a less than excellent score. In addition to Swancutt and Wood the crew, which was out of the running for a time, includes Maj. William Adams, navigator, Capt. Paul Chenchar Jr., radar observer, Capt. William C. Harrison, co-pilot, Lt. Robert Glenn, flight engineer, T/Sgt. Jack Cothran, radio operator, Cpl. Herbert Lyons and Cpl. Roland N. Modlin, scanners. ☆

The No. 1 crew which was finally selected to drop the atom bomb.

Majors Wood and Swancutt chat with Brig. Gen. Roger Ramey.



SUPERSONIC

Unique Problems of Flight Beyond the Speed of Sound Are Probed by Scientists in Tunnels

By SGT. VIVIAN L. SCHECTMAN

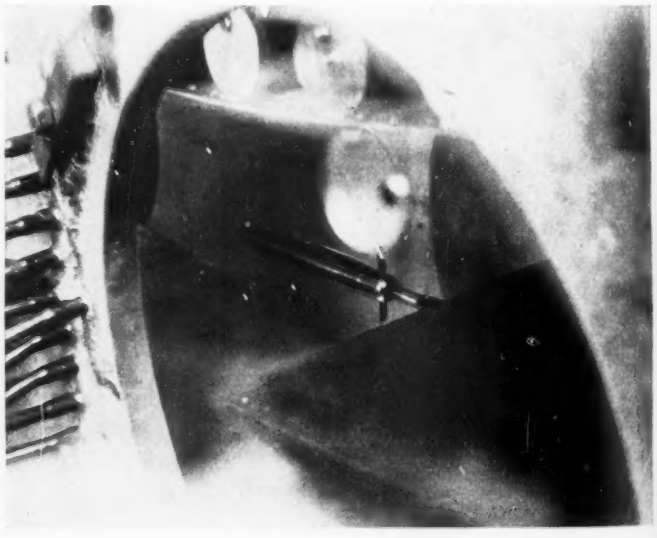
AAF REVIEW *Staff*

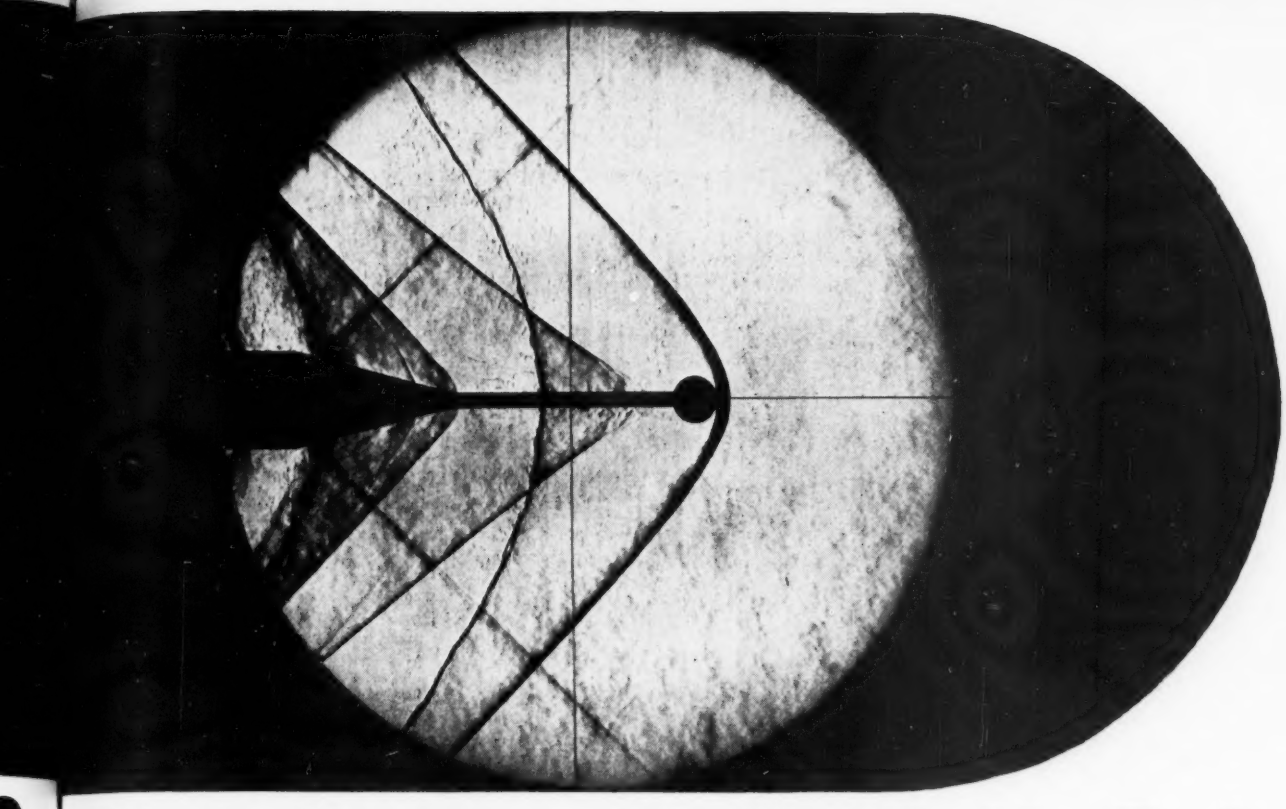
Flights beyond the speed of sound can become an accomplished fact but not before its unique problems are solved in America's wind tunnels and laboratories. The fundamental factors controlling the designs of the supersonic aircraft of the future are being worked out today. Achieving speeds faster than sound has involved almost insurmountable barriers, but solutions are finally emerging from transonic and supersonic tunnels.

The greatest obstacle is the sonic barrier. As the speed of sound is approached by an aircraft serious difficulties arise. At sea level sonic speed is approximately 760 mph. Under other conditions of temperature and pressure, sonic speeds may be as low as 630 mph or as high as 800 mph. Any object moving in the transonic range between 600 to 900 mph encounters strange disruptive phenomena so violent that they constitute an actual physical barrier. The behavior of air changes abruptly from a smooth flowing stream to an irregular series of violent waves. This occurs when the air moves so fast over the wing that it reaches the speed of sound and generates a shock wave which is produced by air piling up around the leading edges of the wing. Behind this shock wave is considerable turbulence. Drag multiplies enormously and elevator effectiveness decreases to the vanishing point. As a result planes flutter violently and fall apart in mid-air. Others plunge to the ground in uncontrollable vertical dives. Obviously, the problems of breaking through the wall of compressibility will have to be solved in the wind tunnels. The aircraft designed for speeds in excess of 1,000 mph will be based on the results.

The first supersonic experimental tunnel for aerodynamic research in America was built at Langley Field, Va., in 1929 by the National Advisory Committee for Aeronautics. Supersonic tunnels are now being built or have been recently completed at Ames Laboratory, Moffet Field, Calif.; Wright Field, Ohio; Cornell Aeronautical Laboratory, Buffalo;

Wind velocities reach 1,500 mph in Langley's supersonic tunnel



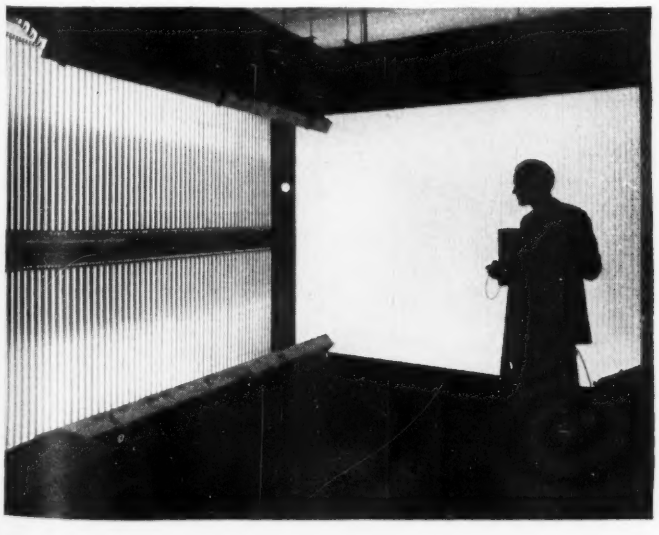


WIND TUNNELS

NACA's Cleveland Laboratory, and the Aberdeen Proving Grounds, Md.

Supersonic tunnels are the latest additions to the wind tunnel groups Miniature in size, the largest is scarcely 100 feet long. Yet while the size is limited, it is more complex than the subsonic and transonic tunnels. In any subsonic wind tunnel, the throat or constricted test area can take speeds only up to 750 mph. It then chokes on shock waves and can receive none faster. Supersonic tunnels are designed so that the test section is placed slightly behind the constricted area of the throat, but because of the expansion in the tunnel the air goes faster and achieves supersonic speeds.

Tunnel pressures are indicated on mercury manometer boards



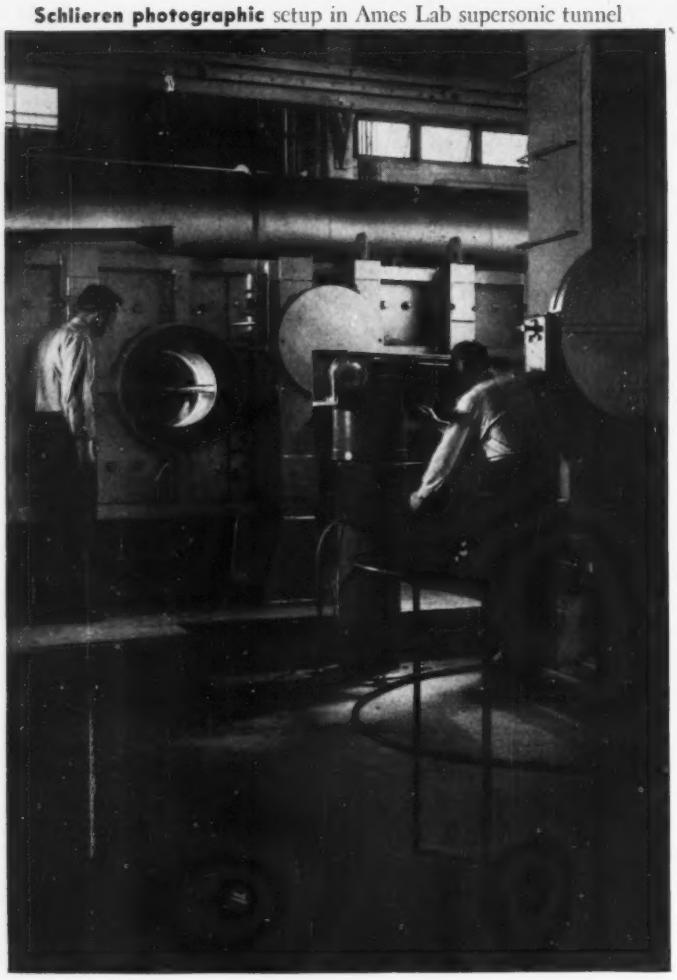
At the Ames Laboratory of the NACA at Moffet Field, Calif., the recently completed 1,500 mph tunnel is designed to operate exclusively above the speed of sound (760 mph). Accurately made steel models are mounted in the three-square-foot test section of the new supersonic tunnel. Air is forced through this constricted channel at as much as twice the speed of sound, simulating the conditions encountered by a supersonic aircraft. Power is provided by three electric motors totaling 10,000 hp driving four three-stage centrifugal compressors which rotate at a constant speed of 5,350 rpm. The heat generated in the compression of the air is removed by passing the air through large water-cooled radiators in the tunnel circuit.

Variation of the scale of flight is achieved by changing the pressure inside the tunnel from a near vacuum up to almost three times normal atmospheric pressure. Sensitive regulators maintain the pressure automatically at the desired value. In addition, the humidity of the air in the tunnel can be accurately controlled. Air dryers permit reduction of moisture contents inside the tunnel to as little as one percent of that of normal atmospheric air.

Missile or aircraft models are supported in the stream of air on a slender boom extending from a balance which weighs the aerodynamic forces. Lift, drag and pitching moment acting on the model are transmitted to springs whose deflections are measured by electrical strain gauges. Simultaneously a sensitive optical apparatus permits the flow of air past the model to be photographed and observed Details of the flow pattern visualized by this "Schlieren" method provide a valuable aid in interpreting the numerical balance data.

Even greater speeds, up to the present foreseeable limits

Schlieren photographic setup in Ames Lab supersonic tunnel



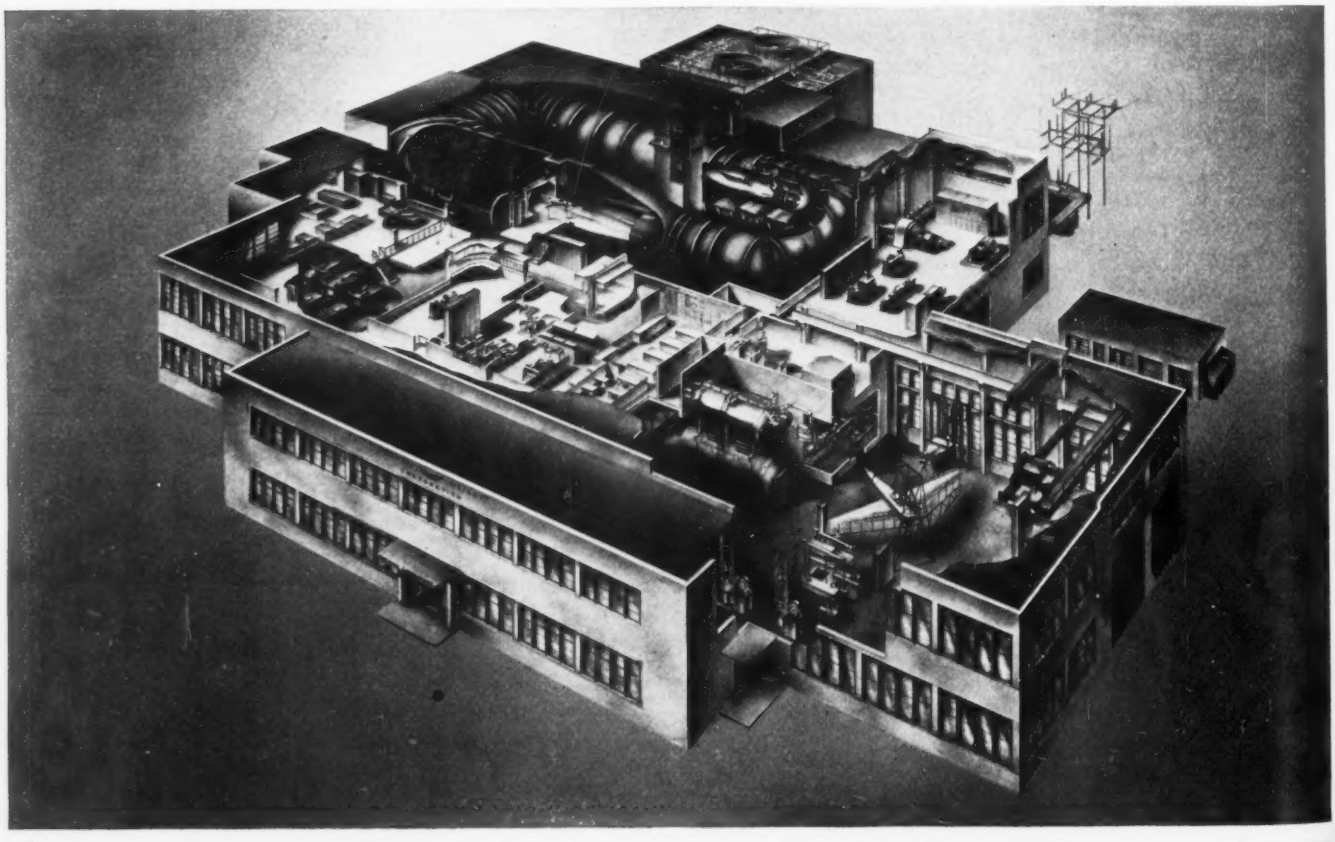
for guided missiles and aircraft, will be reached in supersonic wind tunnels nearing completion at Langley Field and Ames Laboratory. Complementing the present apparatus at Ames, the available range of supersonic testing speeds will be extended to an extreme of 3.6 times that of sound—more than 2,600 mph—for short periods of time. Having a test section identical with the electrically-driven tunnel to permit interchange of models, this "blowdown" tunnel will operate intermittently from a huge pressure tank. All observations will be made within a period of about 10 minutes, in which time the entire supply of high pressure dry air is exhausted to the atmosphere.

A second important problem was drag. The chief effect of very high speed on both plane and propeller was a marked increase in the drag of air. At normal speeds drag is proportional to the square of the speed; so that if a plane's speed doubles, drag quadruples. But at high speeds, before the sonic barrier is reached, drag begins to increase at abnormal rate. This requires a tremendous boost in horsepower for the supersonic plane, a gap which the jet engine successfully bridges. Fortunately, experiments show that drag does not continue to soar alarmingly once supersonic speed has been reached.

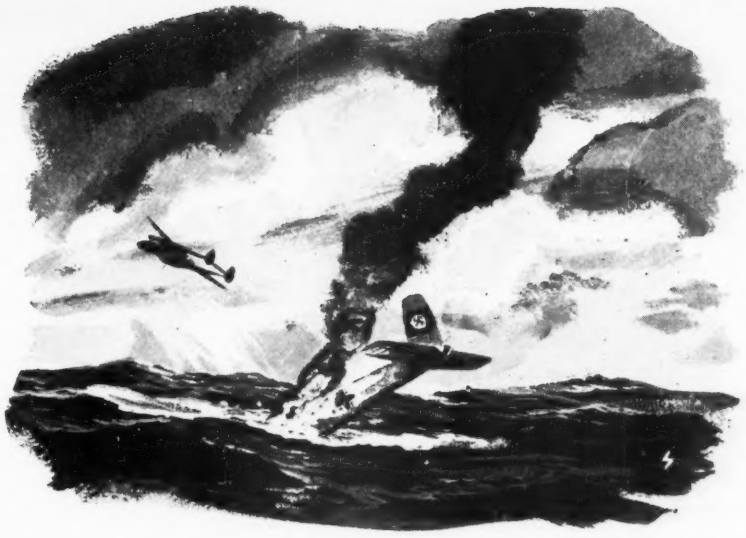
At present the supersonic tunnels at the Cleveland Laboratory provide speeds up to twice that of sound, and are used to investigate various body and wing forms, with particular attention to intakes and the problems of high speed propulsion systems.

Solutions for high speed dive and controlability problems were solved several years ago at Langley Field's High Speed Tunnel. Supersonic speed is now feasible. To design and fly a faster-than-sound aircraft will take time, but from solutions reached in transonic tunnels plus first results of supersonic tunnel experiments, engineers are looking toward the beyond-the-speed-of-sound plane. ☆

Cutaway drawing of new Cornell University Aeronautical Laboratory at Buffalo showing variable density wind tunnel.



AIR FORCE'S OLDEST



First Fighter Group, winner of 17 battle stars in two wars, may be used for tactical experiments at Air University

By Maj. Charles P. Beazley
AAF Review Staff

I

Its battle flag carrying the streamers of 17 major conflicts of two World Wars, the First Fighter Group is destined to play a new role in the postwar development of airpower in the United States—that of training high echelon air leaders of the AAF. The Group is scheduled to be assigned to the Air University at Montgomery, Ala., and probably will be activated again in September. It went down to zero strength at Camp Marcianise, near Caserta, Italy in October 1945.

In selecting the Group for tactical experiments in fighter defensive and offensive warfare, the Army Air Force has chosen the oldest air combat unit in the country. The Group grew out of the First Pursuit Organization and Training Center, organized at Villaneuve-Les Vertus, France. It was converted into a combat unit May 5, 1918. Many of the pilots had undergone baptism of aerial fire in the Lafayette Escadrille under command of the French. Around its activities during the 28-year period a chronicler could easily weave the central historical theme of the AAF.

Many of the original pilots have taken their places among the famous of our history. Accounts of their World War I exploits in the years of peace served to glamorize the Air Corps, and contributed greatly to its popularity at the outbreak of this war. To mention a few of these pilots: There was Major Raoul Lufbery, originator of many flying tactics of today. There were Quentin Roosevelt and Hamilton Coolidge, among the first to die in combat; James Norman Hall, co-author of "Munity on the Bounty;" Captain Edward V. Rickenbacker, America's leading ace of World War I; Pat Maloney, managing editor of the Chicago Tribune; and Harold H. Tittman, charge d'affaires in the Vatican during the German occupation of Italy. Frank Luke of Arizona, known as the "balloon buster," was among them.

During the years intervening the two World Wars many of our Air Force general officers of today, commanders whose names became familiar to every Allied nation during the late conflict, received training in the First Fighter Group. The reason is not hard to find. From the date of its reactivation in March 1919 until June 1932 it was the only fighter outfit in the Air Corps.

94th FIGHTER SQDN.

Until Pearl Harbor the outfit was known as the First Pursuit Group, based at Selfridge Field, Mt. Clemens, Mich., and was made up of the 17th, 27th and 94th Pursuit Squadrons, insignia of which were, respectively, the Great Snow Owl, The Black Falcon and the Hat-in-the-Ring. The 17th Pursuit Group was detached October 31, 1940 and sent to the Philippines. In its place the 71st Pursuit Squadron was activated on that date and replaced the 17th among the Group's Squadrons. During World War II, the 71st Squadron turned in a distinguished record.

Among those who either commanded or flew in the squadrons of the First Pursuit Group were: General of the Armies Henry H. Arnold, General Carl Spaatz, commander of the AAF today; Lt. Gen. Ira C. Eaker, deputy commander of the AAF; Lt. Gen. John K. Cannon, commanding general of the Mediterranean Allied Air Forces; Lt. Gen. George H. Brett; the late Lt. Gen. Frank F. Andrews; Maj. Gen. Curtis LeMay; Brig Gen. M. R. Nelson, who commanded the 15th Fighter Command; and Brig. Gen. Emmett J. O'Donnell. And they are but a few of our distinguished air leaders who wore the distinctive insignia. A host of other officers whose World War II achievements were meritorious, can recall nostalgically their days at Selfridge Field long before the war clouds gathered over the world.

The Group's history in War II dates back to the eve of Pearl Harbor. In the autumn of 1941 it participated in the extensive southern maneuvers of the Army, ranging from Savannah, Ga., to Beaumont, Texas. It returned to Selfridge Field early in December when the Japanese fleet was stealing eastward across the Pacific. Two days before the Japanese struck, 20 pilots of the 94th Squadron flew P-38s and P-43s to California bases. A coincidence, but nevertheless they were ready for action. Others were not long in following. In little more than an hour after word of Pearl Harbor had reached Washington on December 7, the Group was alerted Before nightfall on that day the entire unit was packing to move to the West Coast. All remaining pilots flew their aircraft, 12 P-38s and 24 P-43s to the Coast on the next day. The ground echelon followed by train.

Attack by carrier-based Japanese planes was believed imminent. The only units ready to meet them were the fighter squadrons themselves. The Group's squadrons were installed at North Island, San Diego and March Field. The Japanese air threat failed to develop, but nevertheless the Group together with other fighter units and bomber groups maintained constant vigilance along the entire Western Coast during those critical days. In February 1942 the Group was operated by the Fourth Interceptor Command of the 4th Air Force from its Information Center in Los Angeles.

GENERALS ARNOLD, SPAATZ, EAKER, BRETT AND MANY OTHER AERIAL LEADERS ONCE WORE INSIGNIA OF THE GROUP.

Because of the experience and training of its officers and men the Group was called on to furnish cadres for the activation of other pursuit units. It was the parent of the 31st, 52nd, 58th, 80th and 82nd Fighter Groups, all of which saw combat duty overseas. Some bagged more enemy aircraft than the parent, but it should be remembered that many of the key personnel of the new groups had been tried and tested in the First Pursuit Group in the years of peace.

Finally, in April 1942 the Group received secret orders, presaging a move overseas.

In Europe, the Hitlerite hordes had overcome all continental resistance. Field Marshall Rommel had swept across North Africa and was threatening Alexandria. Pressure on Great Britain was never greater. About May 15 the air echelon departed Los Angeles and Glendale, Calif., for Dow Field, Bangor, Me. It was then that most of the personnel suspected they were bound for either England or the Middle East. The ground echelon left Glendale by train for Fort Dix, arriving May 24. It sailed on the Queen Elizabeth a few days later and debarked at Gourock, Scotland, June 9.

II

Meanwhile the air echelon was readying itself for a mass flight across the Atlantic. Many preparations had been made in California, although the pilots, crew chiefs and mechanics little realized their significance at the time. At Dow Field their activities were cloaked for secrecy. Finally, the air echelon took off in B-17s, C-47s, and P-38s for Goose Bay, Labrador. After a brief lay-over there, the little air armada flew to Greenland; then to Iceland and later to Ireland and Scotland. The air echelon reached the European Theater with only a few losses. For completing the first mass movement over the North Atlantic, the 8th Air Force awarded Air Medals to 71 pilots of the Group.

The Black Falcon or 27th Squadron remained in Iceland from July 6 until August 20 patrolling the North Atlantic sea lanes under the Iceland Defense Command. In those days, Focke-Wulf Kuriers, Germany's big four-engine, long-range bombers, swept the seas in search of convoys. Aircraft based in Iceland frequently intercepted them. On one patrol 1st Lt. Elza K. Shahan of the 27th Squadron, destroyed a Focke-Wulf. He was acclaimed the first AAF pilot to shoot down an enemy aircraft in the European theater and was awarded the Silver Star for this victory.

By August 29 the last of the Group's aircraft had arrived in England. Two days later a section of P-38s was scrambled form Ibsley, England, for bogies coming in over the Channel. And on September 1 the Group flew its first offensive sweep over German-occupied France.

On September 30 the Group was host to an interesting visitor, Captain Eddie Rickenbacker who commanded the 94th Squadron during the latter part of World War I. It was a gala occasion. He brought with him silver insignias of the Hat-in-the-Ring which the outfit wore in the first war. By a special arrangement with General Arnold, the 94th was given the privilege of wearing the pins, and Captain Rickenbacker pinned them on the blouses of the officers and men.

Recalling the visit, the World War I ace in his New York office said recently: "I took with me 150 Hats-in-the-Ring, thinking there would be enough to go around. In my day a squadron consisted of about 100. I was surprised to find the 94th several times larger, and I did not have enough."

In late October 1942 the Group found itself again under secret orders. Speculation was widespread, for there was no inkling of its destination. The ground echelon boarded the Empress of Canada and sailed out to sea. When it went ashore again at Oran November 8, the invasion of North Africa was under way. On three successive days beginning November 12, the air echelon departed England in P-38s and C-47s, each of the three contingents landing the following day at Tafaroui, thus completing the second mass movement of aircraft across the seas with the loss of only one pilot and aircraft, and the internment of another at Lisbon.

Meanwhile, Northwest African air bases had been secured and on November 20 the Group began escorting bombers of the 12th Air Force on tactical and strategic missions in coordination with the Allied Ground Forces. The Hat-in-the-Ring Squadron operated for a time out of Youks-Les-Baines, and the 27th and 71st Squadrons out of Maison Blanche near Algiers. At this time the strength of the Group and its Squadrons was 118 officers and 878 enlisted men.

Nearly every sortie of the Allied Air Forces in North Africa was bitterly contested by the Luftwaffe which at that time had a far greater number of aircraft and more battlewise crews than the Allies could muster. As a consequence our fighter aircraft found escort of the bombs a difficult assignment. Besides, replacements of personnel and equipment were hard to obtain. Fierce air battles entailing frequent losses made themselves felt on the air legions committed to battle. The severity of the North African campaign in the winter of 1942 and 1943 will

COAT OF ARMS

BLAZORY

Shield: Vert five bendlets enhanced sable fimbriated or, as many crosses patee in bend debased three and two of the second fimbriated argent.

Crest: Upon a wreath of the colors or and vert upon a hurte wavy an arrow palewise reversed between two wings displayed conjoined in lure or.

Motto: Aut Vincere aut Mori (Either Conquer or Die).

DESCRIPTION

The five stripes in black on the green background of the shield represent the five units in the Group organized when the Air Service colors were black and green. The five crosses indicate five major engagements in which the Group participated during the World War. The Crest, a winged arrow in a blue sky, is indication of the mission of Pursuit, "Attack in the Skies." The colors of the Crest, midnight blue and gold, are the present Air Corps colors.

(Approved by Secretary of War 2 October 1924).

always be remembered by those who participated in it. Particularly arduous was the lot that befell the pilot. He flew every day it was possible to get his aircraft off the ground. He had little relief and his 50-mission combat tour was over, usually, in four months if he were lucky enough to survive.

When New Year's Day 1943 arrived, the Group was stationed at Biskra, southeast of Algiers beyond the Atlas Mountains. A city whence the camel caravans depart on their southward trek across the Sahara, Biskra had been a popular winter resort, but that winter it had more than its normal share of cold, rainy days. Occasionally siroccos blew in from the Sahara. Living conditions were bad, the city crowded, but flying officers found shelter in a small hotel. Ground officers and enlisted personnel lived in pup tents or foxholes. Luftwaffe raiders, swooping down over the towering Atlas, were not infrequent visitors. Up to this time, a flight surgeon reported, pilot morale had been poor because of adverse living conditions, long hours of combat flying and few stand-downs. Lack of replacements had been a basic complaint, but at Biskra replacements began to arrive.

As Marshall Rommel was retreating into Tunisia the Group moved again, and on February 1 set up headquarters at Chateau-Dun which proved to be a more desirable location in many respects. Operations continued on an all-out scale. The Luftwaffe's strength had begun to wane, but it was struggling valiantly to maintain an air shield over Rommel as he stabbed furiously against the Allied ground forces through Kasserine Pass the middle of February. P-38s of the Group tangled frequently with FW-190s and ME-109s in that critical battle. They continued to escort our bombers which sought to cut the Afrika Korps' supply line. It was a grim struggle and the Group's losses to enemy action were heavy. They were compensated, though, by many sensational air victories. Pilots bagged enemy aircraft almost daily.

Early April found the bloody Tunisian campaign drawing to a close. Rommel had slipped safely away to Germany, and von Arnim had taken over the Afrika Korps which Field Marshall Montgomery and General Eisenhower had bottled up on the plains and hills near ancient Carthage. It was on April 10 that the First Fighter Group achieved one of its most brilliant air victories. Eager for the kill, 25 P-38 pilots shot down 24 enemy aircraft over Cape Bon. It was one of the triumphs about which the boys had dreamed for months, magnificently executed from the standpoint of teamwork among the flyers and initiative on the part of every pilot engaged.

17th FIGHTER SQDN.

Missions were flown to Sicily and over Italy. About the time of the Sicilian invasion the Group moved to Mateur on the Tunisian plain pitching its camp on a dried lake bed. Summer heat, dust and insects combined to heighten the discomfort of the Group. It was a malarial region, with nearly all of the Arabs suffering with the disease. Atabrine became a part of one's diet. Notwithstanding all of these discomforts, morale of the outfit remained high, for hunting was good. Daily the Lightnings hit enemy installations in Sicily or flew escort over the Italian mainland.

Air battles were rugged indeed. On one mission to Aversa, Italy in escort of B-26s, the pilots encountered 60 to 70 enemy aircraft. The bombers continued on to the target. Eight of the enemy were destroyed, three probably destroyed and five damaged. The Group lost 13 of its pilots by the end of that day. Some of the lads showed up later however.

The invasion of the Italian mainland at Salerno in September was covered by the 12th Air Force heavies and mediums striking from African and Sicilian bases. Here again the Group found plenty of action in its role as escort. In October the air echelon was sent to Libya for a fortnight but, because of the sand storms and extremely unfavorable conditions, it flew only two missions. For a while in November the air echelon was based at Djedeida.

Col. Agan landed inside German lines.

III

By December 5, 1943 the Allies had forced the Axis Armies up the boot of Italy beyond the plains of Foggia on which the enemy had established a complex of airdromes. The Group occupied on December 27 the airdrome at Salsola where it found the wreckage of enemy aircraft destroyed by our own planes on previous fighter sweeps over the Italian Peninsula.

The Group by this time had been assigned to the 15th Air Force which ultimately was to launch paralyzing blows against the enemy's natural and synthetic sources of oil in Central Europe and the Balkans. Veterans of the Group will recall that its commanding officer in those days was Col. Robert B. Richards who had taken over the Group on September 19 of that year. The Group dug in at Salsola, preparing itself in earnest for long-range escort of the 15th Air Force's Liberators and Flying Fortresses. As 1944 opened, the 15th was establishing rapidly its bomber and fighter bases and supply lines all over Southern Italy. Advent of early spring enabled it to launch its air legions effectively in the strategic air war against the Germans. Its targets ranged from Central Rumania across the Balkans, over Austria and Czechoslavakia, Southern Germany and Southern France.

Thousands of veterans of the Italian campaign will recall vividly these large groups of bombers forming up and setting a course for targets deep in enemy territory. As one of the bomber pilots once parodied in a Foggia club:

"From the shores of Lake Lesina
To the ruins of Pompeii
You can hear our engines thundering
In the early light of day."

The P-38s weaving in formation over the Forts and Libs were a welcome sight to the bomber crews because enemy fighter opposition was often terrific. To relate one classic air battle: The Ploesti oil fields in Rumania constituted a first priority target which was hit again and again. On the

June 10, 1944 raid the pilots shot down 28 enemy aircraft. It was the largest number they ever downed in one day. It was also one of the worst maulings the Luftwaffe received in the Balkan air war. The Group's losses were only a small fraction of those inflicted on the Germans.

Fighter coverage of the heavy bombers of the 15th Air Force usually came under three categories: Penetration, target cover and withdrawal. Field orders issued during the night before a mission stipulated what type of escort was to be furnished, depending upon the distance to the target. If a target were remote from the Italian bases as, for example, the Gleiwitz synthetic oil refineries in Upper Silesia, an escort of fighters would be provided to cover the "Big Friends" going in to the target. Another contingent taking off later would rendezvous in time to provide target cover and partial return from the target, while still a third would be airborne even later to escort the heavies back to the Italian bases. At targets less remote from the Foggia area such as the Iron Gate at Turnu Severin, the same contingent of fighters provided penetration, target cover and withdrawal.

Throughout the spring of 1944 the First Fighter, one of the three P-38 groups assigned to the 15th Fighter Command, engaged in heavy bomber escort missions. Pilots will recall some of the sharp engagements over the Vienna area. Also they will remember the Herman Goering Gruppe of yellow-nose FW-190s that used to pierce-dive through bomber formations, usually knocking down a few in desperate attempts to break up our bomb runs. Some days enemy fighter opposition would be negligible. At most of the targets, particularly the oil refineries, flak was often "so thick you could taxi on it." Flak took its toll of our fighters. Usually, however, they were able to evade these barrages.

About August 1944 the First Fighter Group was detached and sent to Corsica, where for three weeks it engaged in tactical operations coordinated with the invasion of Southern France. It operated under the 87th Fighter Wing. Squadrons flew fighter sweeps over the Riviera, up the Rhone Valley over the enemy airfield complex at Istres and also strafed rail lines and highways of the Var and Provence areas. These sorties were greeted with enthusiasm by the pilots who got a tremendous "lift" out of the Corsican interlude. After successful completion of the Southern France invasion the Group returned to Salsola, resuming high altitude escort of the Big Friends.

Occasionally fighters were assigned to air-sea rescue missions, dragging the Adriatic or Tyrrhenian Seas in quest of some Allied air crewman who had called in a "May Day" and had ditched. Frequently the fighters escorted photo recons over German-held areas. And when "Photo Freddie" was jumped by Jerry aircraft, spectacular dogfights ensued. Nearly always the recon came back with the pictures; frequently the fighter escort returned with a victory.

Still another phase of the Group's operations, in which other fighter outfits of the 15th Fighter Command also participated, was that of escorting transport planes on supply - dropping missions to partisan bands resisting German occupation in their native countries. Many of these supply - dropping missions were made over Yugoslavia, some to occupied Greece and to islands along the Dalmatian coast. The Group also furnished fighter protection to C-47s evacuating liberated Allied aircrews from the Balkan countries.

Since the American heavy bombers operated by day there was little night combat flying. On routes to and from the target the fighters usually flew "at altitude" which meant between 22,000 and 27,000 feet. They were on oxygen most of the time. Missions usually lasted four or five hours. That was a lot of time to sit in a cockpit in sub-freezing, high altitude temperatures flying an airplane in formation, observing RT silence and on the lookout for bogies. An escort sortie to Brux, in western Czechoslavakia and back, constituted a full day's work for any man. At the end of 50 missions of this type a pilot had turned in a full combat tour; he was ready for a trip back to the States.

IV

Winter rains falling in late autumn 1944 and early 1945 converted the rich loam of the Foggia plain into a quagmire. Shortly after New Year's Day, Col. Arthur C. Agan, who had come over from Caserta to relieve Col. "Bob" Richard a few weeks before, received secret orders assigning the First Fighter Group to a unique mission. As the fragmentary orders came in, classified top secret information,

FIRST FIGHTER GROUP

BATTLE STARS

In World War I the First Pursuit Group took part in five major campaigns and was awarded battle streamers for them. These are:

- ☆ CHAMPAGNE-MARNE
- ☆ AISNE-MARNE OFFENSIVE
- ☆ MEUSE-ARGONNE
- ☆ SAINT MIHIEL
- ☆ VERDUN

The First Fighter Group won 12 battle stars in World War II for the following Campaigns:

- ☆ AIR OFFENSIVE OVER EUROPE
- ☆ MOROCCAN-ALGERIAN CAMPAIGN
- ☆ TUNISIAN CAMPAIGN
- ☆ SICILIAN INVASION
- ☆ NAPLES-FOGGIA CAMPAIGN
- ☆ ROME-ARNO OFFENSIVE
- ☆ GERMAN AIR WAR
- ☆ SOUTHERN FRANCE INVASION
- ☆ AIR COMBAT BALKANS
- ☆ NORTHERN APENNINES CAMPAIGN
- ☆ PO VALLEY OFFENSIVE
- ☆ CENTRAL EUROPEAN CAMPAIGN

ESCORT FOR 12th AND 15th AIR FORCE BOMBERS IN THE MTO WAS THE PRIMARY MISSION OF THE FIRST FIGHTER GROUP DURING WORLD WAR II.

the colonel realized the full import of the assignment.

To students of the classics the story of Jason and the Argonauts who sailed into the cold Euxine sea in search of the Golden Fleece is one of the most intriguing in Greek mythology. And now, thousands of years later an American Fighter Group was about to embark on what the code name called Operation Argonaut! At San Vincenzo Airdrome west of Foggia, where First Fighter aircraft were based temporarily, the colonel called together the squadron leaders and pilots most experienced in combat. He provided them only with the bare essentials of the projected journey. Early one morning in January the P-38s took off, formed and set course to the southwest. They were gone nearly a fortnight. They returned to their base, remained until February and then departed again in the same fashion. Again they returned. Nobody knew where they had gone on the first trip nor was it divulged where they had gone on the second.

When at last the veil of secrecy was lifted, it was revealed that the First Fighter Group had escorted the C-54s transporting President Roosevelt and Prime Minister Churchill from a point west of the Strait of Gibraltar, along the North African coast and over the Black Sea to Yalta in the Crimea. At Yalta, President Roosevelt, Prime Minister Churchill and Premier Stalin sought to find the Golden Fleece in the form of an amicable postwar accord between the three great Allies. Results of that conference are now making history.

27th FIGHTER SQDN.

To conclude our story: Two of the Big Three were escorted back safely to the Atlantic, well beyond the striking range of enemy aircraft. Not once during the entire route that covered 16,000 miles over three continents was there a mishap of any sort, and it was one of the best kept secrets of the Mediterranean.

Clearing skies early in March permitted the First Fighter Group to resume full-time operations. By that time the Russian offensive was sweeping through the Balkans, up the Danube Valley over the plains of Hungary. On the Western front the American and British armies were surging through the Rhineland, driving east toward their Russian Allies. It was in March that the First Fighter Group and others in the 15th Fighter Command frequently were assigned to tactical missions—mostly strafing communication lines in the rear of the hard-pressed Wehrmacht. and dive-bombing key bridges and important railway lines.

These assignments were greeted with delight by the pilots. They reveled in the opportunity to make low-level strafing attacks on trains and motor transport. A great deal of tactical work of this sort had been done late in 1944, but now that the Allies were poised for a knock-out blow, the Fighter Groups went to work in earnest. The First Fighter Group moved on March 15 to Lake Lesina on the north coast of the "spur" of Italy. Here they would load their P-38s with belly tanks and bombs, take off and form early in the morning, fly northward over the Austrian Alps and bomb or strafe communication lines in western Austria and Bavaria.

These missions caused far more havoc behind the enemy lines than the 15th Air Force leaders realized at the time. Shooting up locomotives, strafing and damaging freight cars, blowing up motor transport and knocking out bridges not only took its toll of German facilities, but had extremely adverse effect on the enemy sense of safety and morale at home.

Illustrative of this type of mission was the last one flown in Europe by Colonel Agan himself. As it was the custom of most group leaders he flew with the 94th. That morning he showed up bright and cheerful as usual in his flying gear. He had a bandaged thumb under treatment for X-ray burns, and carried a small vial of penicillin as a supplement to his first aid kit. The Group that morning had been ordered to strafe rail lines along the Danube west of Vienna. The battle lines extended roughly northward from Lake Balaton to Bratislava, and the route that the First Fighter Group was asked to follow on penetrating to the target area was not far to the west of the lines.

When the Group finally broke through the cloud bank in the vicinity of Wiener-Neustadt, the earth was literally aflame from artillery flashes. The Russians and Germans were hurling tons of explosives at each other and ground battle was rapidly approaching the height of its fury. German anti-aircraft batteries opened a thunderous barrage on the P-38s. One burst set afire the group leader's aircraft and the colonel "hit the silk." He parachuted to earth 1,000 yards or so inside the German lines. As he collected himself he attempted to make sure the vial of penicillin was still secure on his person. A Wehrmacht soldier, mistaking the colonel's action as a hostile move, knocked him over the head. Dazed for a moment Colonel Agan held on to the wonder drug. He was allowed to take it with him to Stalag Luft III where it was an object of curiosity to Allied airmen who had been prisoners a year or two.

Although eminently successful, these low level strafing attacks were not made without loss. On one foray between Zellam See and Regensburg, all three squadron leaders were shot down. On the whole, however, the loss of aircraft and pilots was not excessive, because of the individual skill of the flyers and the adroit management of the flight leaders. In early April, when Field Marshall Sir Harold Alexander, Supreme Commander of the Mediterranean, opened the all-out attack against the Germans lodged in the Apennines, the First Fighter and other groups of the 15th Fighter Command worked over the Po Valley communication lines effectively, aiding in the disintegration and final surrender of the German forces in Italy.

The last mission of the First Fighter Group was an escort of supply-dropping C-47s which took off early on the morning of May 6, 1945 for Yugoslavia, the last day of hostilities in Europe. On May 7 Grand Admiral Doenitz, Fuehrer-designate of the German armed forces, surrendered unconditionally. The escort mission into an area beyond Sarajevo, birthplace of World War I where partisans were mopping up the last of German resistance, was uneventful.

In early April an incident occurred that created a sensation among the pilots. An experimental contingent arrived at Lake Lesina from Wright Field, Ohio. It had two P-80 Shooting Stars brought to this remote spot in the Italian Peninsula for testing under combat conditions

(Continued on Page 42)

CURTAIN RAISER

By Lt. C. R. HART and Sgt. T. S. MENKEL AAF REVIEW *Staff*

Jules Verne or his latter-day spiritual brothers Dick Calkins and Rick Yager, creators of the famous space-flying comic strip character, Buck Rogers, would have had a hard time dreaming up an imaginary show better than the real one presented for the benefit of 200 newspaper, radio and magazine writers and photographers at Dayton, Ohio, last month.

On June 3, 4 and 5 in what might be realistically described as the official "curtain raiser" to the Sonic and Supersonic Air Age literally just around the corner, the Air Materiel Command for the first time since war's end revealed many of the Army Air Force's top war secrets, and in doing so permitted the public to gaze into the future of tomorrow's US airpower.

How they reacted to this display, some of it almost fantastically unbelievable, is best summed up in the passing remarks of two of the guests. One who decided to get a drink from a fountain in the Engines Laboratory pressed the handle, and to his great surprise the water flew out for six feet or more.

"My God," he said, "even the drinking fountains around here are jet-propelled!"

The other, who had been sucking in his breath sharply after each 600-mile-an-hour pass at the field made by a demonstrating P-80, shook his head wearily when the jet fighter was followed by a review of the conventional 400-mile-an-hour fighters and fighter-bombers.

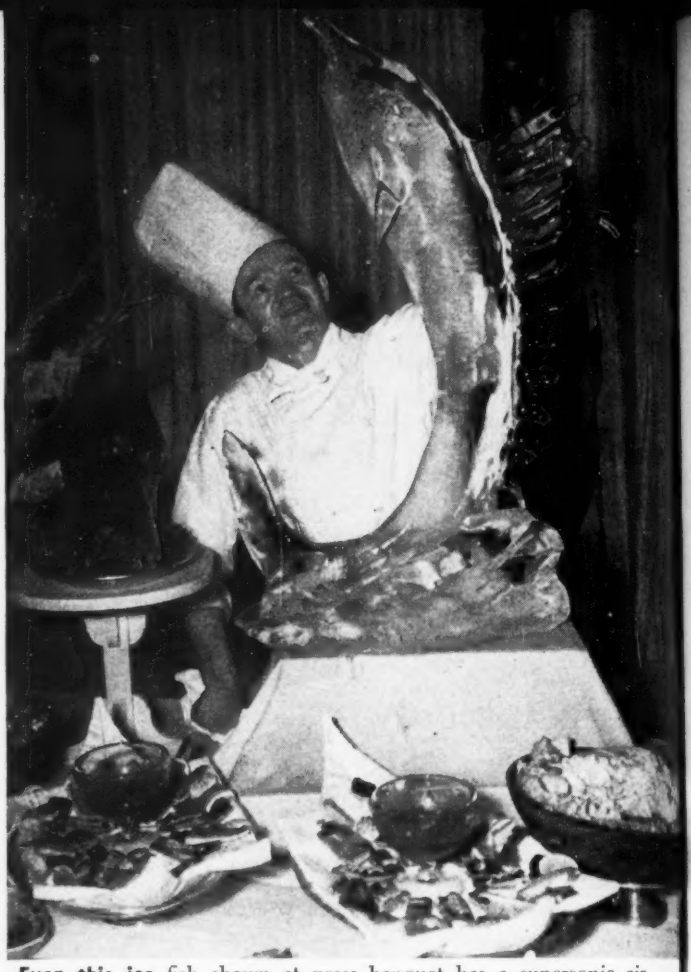
"They must have lost their engines," he said. "They're just hanging up there."

During the course of the three-day show the press representatives toured AMC installations at Wright and Patterson Fields and the Clinton County Air Base in Wilmington. Here they saw the latest developments in military aviation and here they were told, both on and off the record, about the planes, the equipment and the long-range projects which will be carried out in the future.

Summing up the reasons for the conference and tour, as well as for the limited, or off-the-record disclosures, Maj. Gen. Curtis E. LeMay, Deputy Chief of Air Staff for Research and Development, told the visitors:

"I feel that you are fortunate in being able to get a good deal of off-the-record information as background for your press and radio contact with the people of the nation. You are in a position to render your country an everlasting service by keeping the following facts constantly before the public: First, that this country is safe from attack only as long as its military air weapons are superior to those of any potential enemy; second, that maintenance of supremacy in the field of military air weapons requires extensive scientific research and development; third, that necessary research and development is rather costly in dollars and cents, but the cost is merely the premium on an insurance policy which guarantees the future safety of the nation, and as such is an absolutely necessary expenditure."

Brig. Gen. L. C. Craigie, Chief, Engineering Division of the Air Materiel Command, developed the same theme, pointing out that the AAF progressed before the war but whatever advances were made came about in spite of and not because of the money appropriated for its use.



Even this ice fish shown at press banquet has a supersonic air.

"AAF progress," General Craigie explained, "depends on three elements: Money, trained manpower and facilities. It has not been enough to win the war. We must guard against any tendency to fall back."

With this explanatory background clearly set forth, in addition to a general word of welcome by Lt. Gen. Nathan F. Twining, Commanding General, Air Materiel Command, the visitors started on what some described as an "Alice-in-Supersonic-Land tour."

They saw, among many startling developments already off the drawing boards and actually in the air experimentally, the fastest plane in the world—the jet-propelled XP-84 "Thunderjet," successor to the war-famous P-47 "Thunderbolt," with an announced top speed of 590 miles an hour in level flight, a service range of 1,000 miles and a service ceiling of more than 40,000 feet. This new fighter has been in the air more than 20 times since its initial flight at Muroc Field, Calif., on February 28, and is reported to have performed with all of the outstanding characteristics of a great fighter plane.

They also saw another plane about which they were asked to say little, beyond the fact that it has been specially designed to explore the secrets of flight faster than sound, which is put at approximately 760 miles an hour at sea-level. This plane, too, which looks strictly like something Buck Rogers might use in a comic-strip flight to the moon, is off the drawing boards. It has already been in the air, and is expected to be given its first pilot-controlled, power test flight before summer is out. According to the engineers who have babied this plane from drawing boards through wind tunnels and other tests, if it is actually successful in achieving the hoped-for supersonic speed, the door will be open to flight at speeds with no limit whatever in the near future.

Other things revealed for the first time were plans for seven new jet planes slated for the AAF, five of them bombers—the XB-45, 46, 47, 48 and 49, and two new fighters—the XP-86 and 87; a newly-perfected pilot ejection seat which catapults a fighter pilot out and up from a disabled plane; latest developments in radar-controlled gun turrets; uses of infra-red, such as transmission of sound by light beams; stereoscopic photography at low altitudes and high speeds; operation of the Ramjet, and an explanation of the principle of its flight; a test-stand demonstration of a simple rocket motor; and two newly-developed life rafts, one holding 104 men and another 20 men.

On the final day of the conference the group witnessed the first public demonstration of "Push-button Flight" at Clinton County Airport in Wilmington. This demonstration featured selected members of the press group who were taken aloft in two flights on a C-47 which took off, flew and landed entirely by remote control of a pilot on the ground.

Also announced at Wilmington was the southern take-off of the Cosmic Ray Research Flight being conducted jointly by the AAF, the Bartol Research Foundation of the Franklin Institute of Philadelphia, and the National Geographic Society. This project, it was explained, has two purposes: To make a systematic and continuous measure of cosmic rays at selected altitudes throughout a 70-degree range of latitude; and, to determine for the AAF the effect of cosmic rays, described as particles of great energy which originate outside the earth's atmosphere and constantly bombard the earth.

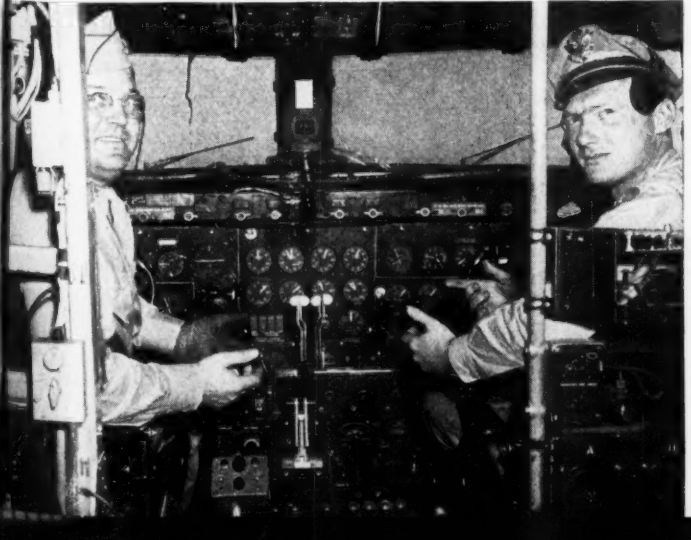
The scientists conducting the tests explained that what they were specifically after was a record of the intensity of mesotrons, particles into which the primary rays are believed to split after entering the earth's atmosphere. These particles, about 200 times heavier than electrons, have a very short life and are believed to represent the end of atomic disintegration.

Climaxed by an aerial review and demonstration at Patterson Field, the show and conference was perhaps best summed up by Herb Shaw of the Dayton Daily News, who wrote: "This newspaper, as did the major newspapers of the country, carried hundreds of words and numerous photographs all concerned with the proceedings. Most of these stories, because they touched on items which have never before been released to the public, tended to be somewhat sensational. However sensational these spot news stories may have been, there was nothing sensational in the underlying objectives of the tour. One had only to scratch the surface to see that in gentle but firm tones the AAF leaders were pointing to the dire necessity of maintaining a strong and progressive air military organization." ☆

Press visitors, above, watch from control room as jet engine performs. Below, a view of the B-29 Cosmic Research plane.

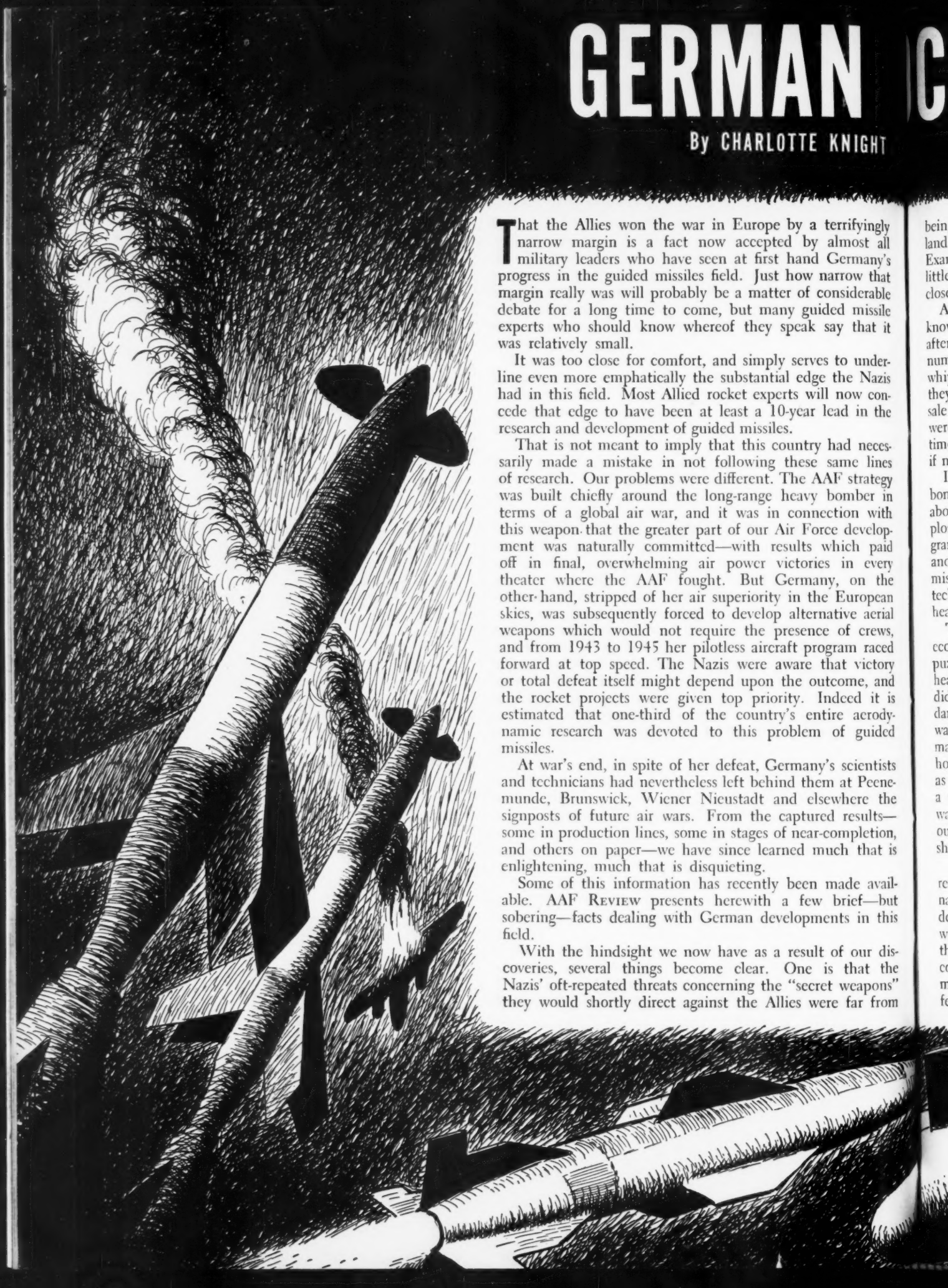
This conference guest takes a quick glimpse at future Air Age.

It's strictly "hands off" controls during push-button flight.



GERMAN C

By CHARLOTTE KNIGHT



That the Allies won the war in Europe by a terrifyingly narrow margin is a fact now accepted by almost all military leaders who have seen at first hand Germany's progress in the guided missiles field. Just how narrow that margin really was will probably be a matter of considerable debate for a long time to come, but many guided missile experts who should know whereof they speak say that it was relatively small.

It was too close for comfort, and simply serves to underline even more emphatically the substantial edge the Nazis had in this field. Most Allied rocket experts will now concede that edge to have been at least a 10-year lead in the research and development of guided missiles.

That is not meant to imply that this country had necessarily made a mistake in not following these same lines of research. Our problems were different. The AAF strategy was built chiefly around the long-range heavy bomber in terms of a global air war, and it was in connection with this weapon that the greater part of our Air Force development was naturally committed—with results which paid off in final, overwhelming air power victories in every theater where the AAF fought. But Germany, on the other hand, stripped of her air superiority in the European skies, was subsequently forced to develop alternative aerial weapons which would not require the presence of crews, and from 1943 to 1945 her pilotless aircraft program raced forward at top speed. The Nazis were aware that victory or total defeat itself might depend upon the outcome, and the rocket projects were given top priority. Indeed it is estimated that one-third of the country's entire aerodynamic research was devoted to this problem of guided missiles.

At war's end, in spite of her defeat, Germany's scientists and technicians had nevertheless left behind them at Peenemunde, Brunswick, Wiener Nieustadt and elsewhere the signposts of future air wars. From the captured results—some in production lines, some in stages of near-completion, and others on paper—we have since learned much that is enlightening, much that is disquieting.

Some of this information has recently been made available. AAF Review presents herewith a few brief—but sobering—facts dealing with German developments in this field.

With the hindsight we now have as a result of our discoveries, several things become clear. One is that the Nazis' oft-repeated threats concerning the "secret weapons" they would shortly direct against the Allies were far from

CKETEERS

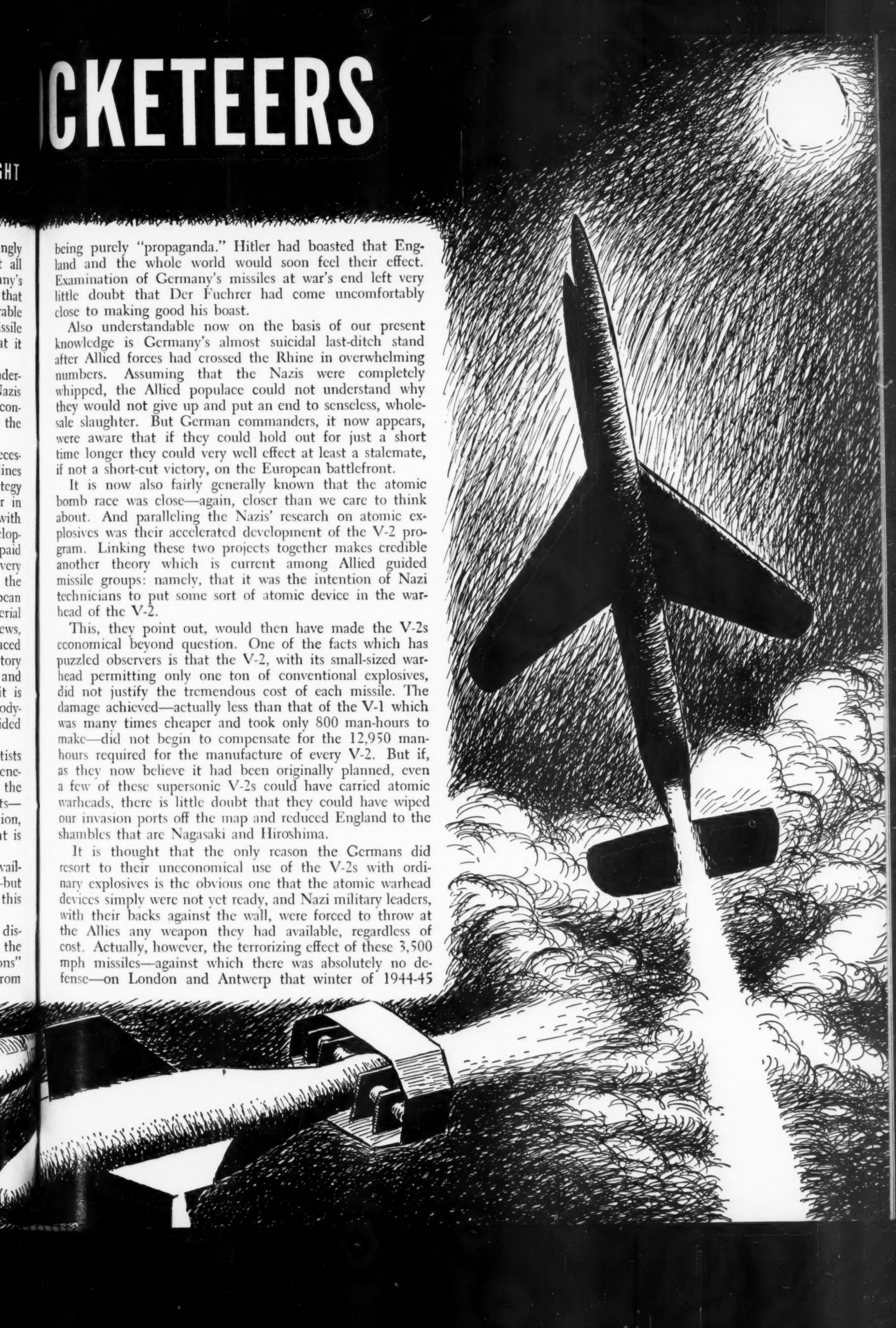
being purely "propaganda." Hitler had boasted that England and the whole world would soon feel their effect. Examination of Germany's missiles at war's end left very little doubt that Der Fuehrer had come uncomfortably close to making good his boast.

Also understandable now on the basis of our present knowledge is Germany's almost suicidal last-ditch stand after Allied forces had crossed the Rhine in overwhelming numbers. Assuming that the Nazis were completely whipped, the Allied populace could not understand why they would not give up and put an end to senseless, wholesale slaughter. But German commanders, it now appears, were aware that if they could hold out for just a short time longer they could very well effect at least a stalemate, if not a short-cut victory, on the European battlefront.

It is now also fairly generally known that the atomic bomb race was close—again, closer than we care to think about. And paralleling the Nazis' research on atomic explosives was their accelerated development of the V-2 program. Linking these two projects together makes credible another theory which is current among Allied guided missile groups: namely, that it was the intention of Nazi technicians to put some sort of atomic device in the warhead of the V-2.

This, they point out, would then have made the V-2s economical beyond question. One of the facts which has puzzled observers is that the V-2, with its small-sized warhead permitting only one ton of conventional explosives, did not justify the tremendous cost of each missile. The damage achieved—actually less than that of the V-1 which was many times cheaper and took only 800 man-hours to make—did not begin to compensate for the 12,950 man-hours required for the manufacture of every V-2. But if, as they now believe it had been originally planned, even a few of these supersonic V-2s could have carried atomic warheads, there is little doubt that they could have wiped our invasion ports off the map and reduced England to the shambles that are Nagasaki and Hiroshima.

It is thought that the only reason the Germans did resort to their uneconomical use of the V-2s with ordinary explosives is the obvious one that the atomic warhead devices simply were not yet ready, and Nazi military leaders, with their backs against the wall, were forced to throw at the Allies any weapon they had available, regardless of cost. Actually, however, the terrorizing effect of these 3,500 mph missiles—against which there was absolutely no defense—on London and Antwerp that winter of 1944-45



must certainly have made the Nazis feel that the V-2s had a psychological value alone far in excess of their actual dollars and cents cost for amount of damage inflicted.

Allied bombings of the Nazi heavy-water plants in Norway quite obviously retarded her atomic development, as did also the consistent sabotage on the part of many Norwegian scientists. But it is still a matter of scientific conjecture just how many weeks—or days—it might have taken Germany to be ready with her atomic devices for the V-2s.

And to continue this same subject of Hitlerian threats, the Nazi claim that Germany had rockets which could bombard the US was not too far removed from actual achievement. Long-range missiles were in the design stage when Allied troops moved into Germany. Larger than the V-2s, these winged rockets, carrying smaller rockets which would take off on their own at a specific point, attain speeds up to 5,800 mph, and finish their trajectories in a long glide, were predicted to be capable of ranges up to 3,000 miles.

Col. D. L. Putt, deputy CG for Technical Intelligence of the Air Materiel Command, describes Germany's famous long-range bomber: "This aircraft, one of Hitler's secret weapons, was a liquid-fuel, supersonic, pilot-controlled bomber intended to fly from Germany to New York at an altitude of approximately 154 miles. The motor was to weigh 2½ tons and develop a thrust of 100 tons. The bomber was to be catapult-launched at 500 mph and rise to altitude in four to eight minutes during which time the fuel would be exhausted. It was then to glide and skip along the outer atmosphere with decreasing oscillations.

"The Aircraft was never finished but it is believed that time was the only obstacle against its completion. The Germans hoped to destroy any large city on earth with a fleet of 100 of these bombers within the space of a few days' operation.

In a recent report on the subject Colonel Putt states that Germany was engaged in research and development work on 138 guided missiles and assorted devices, including modifications. Many were of types wholly unknown to laymen in the U. S.

"The missiles," says Colonel Putt, "used every known type of remote control and fusing means, including radio control, wire control, radar, CW (continuous wave), acoustics, infra-red, light beams and magnetics. In similar fashion all methods of employing jet propulsion for subsonic and supersonic speeds were being fully exploited. Take the ramjet for instance. In the fall of 1944, while development in this country was limited largely to a discussion as to whether such a power plant would operate at all, the Germans had developed, built and flight-tested a unit designed to produce a gross thrust of 4,400 pounds at 500 mph.

"Wind tunnels of undreamed of speeds were under construction. A mach number of 10 (10 times the speed of sound) was not too great for the Germans to comprehend and attempt."

Included in Colonel Putt's report are these principal types of missiles found to be either in production or in the planning stage in Germany at the time the war ended:

• *The Beethoven.* Air-to-Ground. This consists of an ME-109 fighter on top of a Ju-88. The Ju-88 was released in a dive which aimed it at the objective.

• *Enzian.* Ground-to-Air. This is a small-winged flak rocket 17 feet long, carrying 990 pounds of explosives, and controlled in flight by radio. Intended for use against heavy bomber formations.

• *Wasserfall.* Ground-to-Air. A 26-foot flak rocket, similar in design to the V-2, visibly controlled by radio, later by means of radar tracking. This rocket showed great promise and at the end of the war it had the highest priority for development. It could very well have spelled the doom of heavy bombers.

• *X-4 Ruhrstahl* — "Steel-of-the-Ruhr". Air-to-Air. This small six-foot rocket bomb is launched from a fighter aircraft and controlled from the parent through two four-mile lengths of wire. Detonation is by means of a proximity fuse.

• *Fritz X.* Air-to-Ground. Armor-piercing, radio-controlled bomb used with great success by the Germans against Allied ships at Salerno.

• *Hs 298.* Air-to-Air. Four-foot missile controlled either by radio or wire.

• *Hs 117.* Ground-to-Air. "Schmetterling" or "Butterfly" rocket-propelled, radio-controlled missiles to be launched from the ground against bomber formations. They attain a speed of 560 mph and are steadied in flight by a pendulum device. They were in large-scale production in January 1945 in an underground factory at Nordhausen.

• *Rheintochter*—"Daughter of the Rhine." Ground-to-Air. One of Germany's very latest anti-aircraft missiles, rocket-propelled and controlled in flight by radio. Travels at 1,100 mph and carries 330 pounds of explosive (equipped with proximity fuse) to a ceiling of 48,000 feet.

• *FZG-76.* Ground-to-Ground. This is the familiar V-1 "buzz-bomb" which carried 1,870 pounds of explosives a distance of 120 to 160 miles. It is controlled by an auto-pilot, monitored by a compass and altimeter. Range is determined by an air log which shuts off fuel and sets a dive-flap which dives the missile at a steep angle to the ground. It is reported that in June 1944 the Germans had 8,500 V-1s on hand and a production schedule of approximately 1,200 per month.

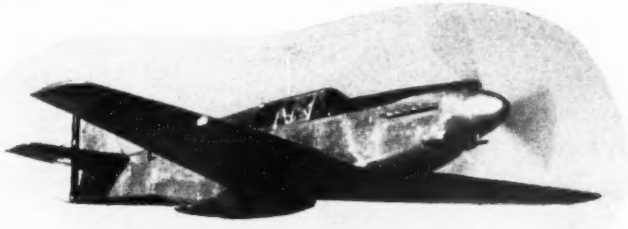
• *A-4.* This is popularly known as the V-2, greatest achievement in the German missile field. This ground-to-ground weapon travels at speeds three times that of the rotation of the earth at the equator. It can soar to heights beyond the reach of any gun or aircraft 75 miles high in a recent test at White Sands, N. M., and when it falls it

(Continued on Page 48)

AIR RESERVE

The Reserve Program Is Awaiting Final WD Approval

A federally-controlled reserve component of the Army Air Force, the Air Reserve program now awaiting final approval from the War Department is geared to provide the nation with a force of more than 880,000 men ready to be mobilized for active duty in case of national emergency. Designed to maintain and increase the skills of flying and ground personnel, the Air Reserve program will be supervised by the Air Defense Command. Under the Reserve program, 22,500 pilots will receive training along with 27,500 other aircrew and non-rated officers and 120,000 enlisted men. The program calls for eligible pilots to receive approximately 80 hours of flying each year. Aircraft to be used include P-51s, AT-6s and AT-11s.



The ADC has completed organizational plans for activation of the initial 40 training sites. Aircraft to be used are being procured from storage depots and as each of the bases is activated, Reservists will be informed by local publicity when to register for classification, assignment and training.

The Reserve program is actually based on two Reserve components: Active Air Reserve and Inactive Air Reserve. The Active Air Reserve will include units effectively organized for rapid mobilization, expansion and deployment. In addition it will include trained commissioned and enlisted personnel for necessary replacements and expansion. The term Inactive Air Reserve will apply to that portion of the Air Reserve receiving no training, no promotions, and no active duty. It will receive last priority in the event of a national emergency.

The primary source of Air Reserve officers will be qualified volunteering veterans of the Armed Forces of the United States who have served honorably during their tour of active duty. Following this initial procurement officers will be obtained from several sources: Individuals with honorable and creditable service as commissioned officers in any of the Armed Forces, graduates of accredited Air Reserve Officers Training Corps or as necessary from other ROTC units, graduates of the Air Academy and graduate Aviation Cadets, flight officers and warrant officers who have served honorably in World War II, enlisted men of the Air Reserve who have been qualified by means of extension courses and are otherwise eligible, persons of special qualifications and value in mobilization and persons not included in any category already mentioned.

For enlisted men, the initial procurement also will be from volunteering veterans of the Armed Forces who have served honorably during the war. Subsequent recruiting will be from students of Air ROTC programs not eligible for commission, voluntary enlistment of those who have served in the Armed Forces. Enlisted men will be provided with incentives for enlisting. Among these are opportunities to attend service schools, opportunities for temporary duty with Regular Air Force units, attendance at regularly scheduled Reserve classes and Air Force extension courses.

Officers of the Active Air Reserve will be given an annual physical examination; flying officers will be given the Physical Examination for Flying (64) at periods prescribed by AAF regulations. All physical standards will be the same as those for officers of the Regular Air Force. Professional efficiency of officers of the Active Air Reserve will be maintained by active duty, attendance at regularly scheduled reserve classes including flying, attendance at service and staff schools, and Air Force extension courses.

Although the promotion policy of the Reserve program has not yet been defined, it will feature plans to maintain and preserve a young and active Air Reserve. Officers of the Inactive Air Reserve will be ineligible for promotion. Enlisted personnel will be encouraged to qualify for commissions by extension courses and subsequent attendance at an OCS type school.

Rated officers will not receive flying training after they have held their ratings for a period of seven years or have become 31 years of age, whichever comes last, except that rated officers considered especially qualified for command or staff assignments, or with valuable technical qualifications may continue to receive flying training up to the maximum ages for service in all grades. To maintain the flying proficiency of the greatest possible number of pilots, flight training will not be given to officers engaged in piloting aircraft as their civilian occupation.

The first 40 bases selected to inaugurate the Reserve Flying Program are as follows: Memphis AAB (Mun), Memphis, Tenn.; Des Moines, (Mun), Des Moines, Iowa; Lowry Field, Denver, Colo.; Romulus AA Field, Romulus, Mich.; Stout Field, Indianapolis, Ind.; Jackson AA Field, Jackson, Miss.; Marietta AA Field, Marietta, Ga.; Portland AAB, Portland, Ore.; Sioux City AAB, Sioux City, Iowa; New Orleans (Mun), New Orleans, La.; Olmsted Field, Middletown, Pa.; Syracuse AA Field, Syracuse, NY; Pittsburgh (Mun), No. 2 (Moon Township); Orchard Place Airport, Chicago, Ill.; Mitchel Field, NY; Cleveland (Mun), Cleveland, Ohio; Van Nuys Metropolitan, Van Nuys, Calif.; Newark (Mun), Newark, N. J.; Wold-Chamberlain Field, Minneapolis, Minn.; Boeing Field, Seattle, Wash.; Morris Field, Charlotte, N. C.; Bedford Field, Bedford, Mass.; Fairfax Field, Kansas City, Kans.; Greensboro-Highpoint AAB, Greensboro, N. C.; Tinker Field, Oklahoma City, Okla.; Adams Field, Little Rock, Ark.; Andrews Field, Md.; Grenier Field, Manchester, NH; Oakland AAB, Oakland, Calif.; Brooks Field, San Antonio, Tex.; Hensley Field, Dallas, Tex.; Scott Field, East St. Louis, Ill.; Billy Mitchell Field, Milwaukee, Wisc.; Richmond AAB, Richmond, Va.; Columbia AAB, Columbia, SC; Miami AAB (36th Street), Miami, Fla.; Salt Lake City (Mun), Salt Lake City, Utah; Offut Field, Omaha, Nebr.; Dow Field, Bangor, Me.; Godman Field, Fort Knox, Ky.

—*Lt. Lawrence T. Gordon.* ☆

ATTACKING th

By CAPT. H. P. ANDERSEN
AAF Review Staff

With Rocket-powered airplane, the AAF will attempt to discover the secrets of flight beyond the speed of sound. Newly designed research aircraft is expected to carry man into the unexplored upper atmosphere.

It is no longer a secret that the AAF is about ready to attempt to fly faster than the speed of sound. And it is no more idle speculation that an American airman soon may smash through the strange sonic barrier, which has been compared to a stone wall, and then hurtle through the stratosphere at more than one thousand miles an hour.

In the near future a pilot will take off in an airplane on what may be the most important mission since man's first flight. He will be the most skillful and resourceful pilot that can be found to ride out the rough transonic range and attain supersonic speeds. In less time than it takes to soft-boil an egg, rocket power will thrust the AAF's new experimental plane from the runway to an altitude higher than that in which most World War II fighters operated.

Instead of souping up present aircraft in an attempt to enter the transonic speed range, AAF scientists at Wright Field have enlisted manufacturers to build an entirely new type of airplane. From the Air Materiel Command's specifications for a craft in which to investigate and study flight and design research problems, at high speeds and extreme altitudes, Bell Aircraft has evolved the rocket powered XS-1, first of a series of strictly research planes. The military application is to come later. Requirements were for an airplane to fly sufficiently long in the transonic speed zone to allow recording of data.

The speed of sound at sea level is approximately 760 miles an hour. Anybody ramming along at 600 to 900 miles per hour is in the transonic range. And the craft really is ramming, for at the transonic range the conventional plane seems possessed of demons. Drag multiplies as much as tenfold. Wind tunnel scientists have observed, and test pilots who have held planes in long power dives have reported that what happens amounts to violent phenomena: Elevators seem welded in place; stick motion, which is a pull motion in the subsonic and supersonic regions, becomes a violent push motion; fearful noise is generated while wing and tail surfaces shudder violently; often they collapse; pilots, faced by such mental and structural hazards in breaching the transonic wall from subsonic to supersonic ranges, often as not failed to survive the attempts.

Back to the wind tunnels would go the test models to probe for the fearsome secret of flight at the speed of sound without loss of life or airplane. Even in the wind tunnels models behaved crazily above 85 per cent of the speed of sound and, more alarming, air refused to flow through existing tunnels at transonic speed when a test model was in-

the SONIC BARRIER

stalled. Langley Field scientists said the model in the tunnel was like a chicken bone in a human throat. Instead of the air sweeping over the model, shock waves so powerful were formed that they could be seen with the naked eye. These waves choked the tunnels, no matter how much horsepower was added to the fans.

So came the clues that we could not continue to force conventional aircraft through the transonic barrier simply by pouring on more power.

From new supersonic wind tunnels—where scale models have been hurled at 2,200 miles per hour into an inert gas, simulating a speed as much as seven times that of sound—or 4,500 miles per hour—came revolutionary data from which to project the transonic plane. Meanwhile, the fate of the Buck Rogers-type individuals who will pilot these new craft came in for the attention of the Aero Medical laboratories at Wright Field.

Upper atmosphere physics were studied and predicted for their effect on materials and man. For instance, pilot enclosures may have to be artificially cooled because of temperature rises resulting from the ram effect of sonic speeds as well as from friction and solar radiation. Supersonic tunnels at Langley and Wright Fields have shown that heat generated by skin friction at 1,500 mph is so great that piloted supersonic planes may have to carry refrigerating equipment more efficient per pound than any yet developed.

Then there are the well-known "Gs." At sonic speeds even a gentle turn of wide radius will subject the pilot to positive "G." Rocket take-offs with their rapid acceleration forces may hinder the flier's muscular power in manipulating the controls. All these are factors in designing and building the sonic plane.

Extreme altitude will be the goal of airmen attempting transonic and supersonic flight, because drag at a given speed decreases as altitude increases. At 60,000 feet, drag is approximately one-fourteenth as much as it would be at the same speed at sea level. Thus only one-fourteenth the power is required. At 80,000 feet drag is half that at 60,000 feet. So supersonic airmen are going upstairs. The thinning air, however, which allows increased speed, starves conventional engines. For that reason, supersonic aircraft are to be rocket-powered. Rocket engines require no outside air as oxygen is carried with them.

Rocket powered, the XS-1 will be able to take off from the ground. But to give it greater endurance it will be taken to high altitudes, released, and it will begin to climb, power on. They are predicting that it will be able to climb higher than has ever been accomplished by man or free balloon, and that in the rarefied upper reaches of the atmosphere it will attain speeds more than twice that of sound, which varies from 630 to 800 mph depending on how high you are and what the thermometer indicates.

After climbing for several tens of thousands of feet in a reared-back attitude, a point will be reached at which, because of fuel expended, the plane's weight will be less than the thrust. So what happens? The pilot stands it on its tail and climbs vertically. Present plans call for a few minutes fuel supply wide open, longer at reduced settings. Yet in those valuable minutes the craft will be moving—far enough and fast enough for the newly-designed instruments to get a work out and record speed and altitude figures which will make headlines if they are released.

What will the pilot see when he reaches the top of his climb and eases his ship over for the long glide to earth? Well, out at Wright Field, AAF scientists say he should see stars! They believe it will be possible in the research aircraft to reach the twilight limit—out there where first magnitude stars should be visible directly overhead as the sun sets, or rises. It seems also that the plane will have to be flown in early morning or late afternoon to minimize the effects of the radiation of the sun.

Fliers generally regard with apprehension the rarefied atmosphere where XS-1 Pilots will be sampling conditions. After a plane has been built to withstand the rigors of sonic speeds, pilot safety factors are musts. The cockpit will be pressurized and the pilot will breathe pure oxygen. He will wear a pressure suit and probably a goldfish-bowl pressure helmet. When the plane reaches an altitude of 80,000 feet, the outside temperature will have dropped to 67 degrees below zero. Yet, the pilot will need no cabin heater! Flying at 1,500 miles per hour skin friction will make a 400-degree oven of the cabin. As emphasized before, the pilot will need refrigeration.

Because exposure to the extreme low pressures of the upper stratosphere would be fatal, since a man's blood would boil, literally, precautions have been taken. If the aircraft becomes disabled, the pilot has few worries. He will be ejected from the plane automatically along with part of the cabin. At the proper altitude he will be freed from the cabin to fall as a free body until he reaches a safe altitude where, again automatically, his special parachute will open, dropping him safely to the ground.

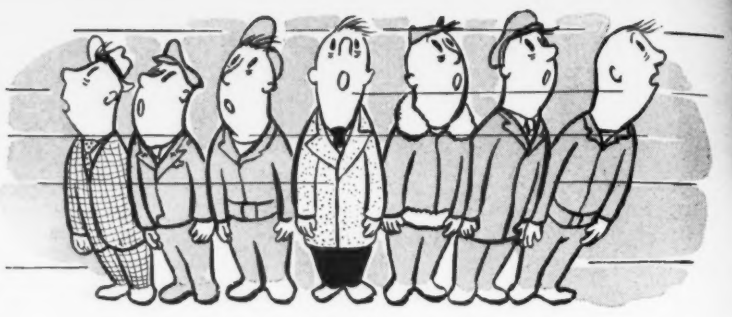
The flight testing has been carefully planned. Characteristics of the plane in flight were obtained by taking it to altitude from where the pilot glided down. In numerous tests, the project's pilot put the plane through maneuvers to determine stalling speeds, control corrections and landing technique. With no rocket motors installed, a dive was made to an observed airspeed of 350 mph at 13,000 feet, in which hardly any noise was noticeable. With ultra-thin wings and tail surfaces and clean fuselage design, he reported that the airplane felt as solid as a rock with no vibration.

The test pilot, Jack Woolam, is optimistic about the new plane's handling characteristics when power is applied. "Of all the airplanes I have flown, only the XP-77 and the Heinkle 162 compare with the XS-1 for maneuverability, control response and lightness of control forces," he said after a drop.

The design of the XS-1 is as new as the year 1950, yet it is still conventional in that man will fly and land it. Aside from pilotless guided missiles, planes capable of 1,000 miles per hour will be useless if they cannot be safely maneuvered. This aerodynamic necessity is incorporated in the XS-1.

Even before the AAF's new research plane has claimed fame, other transonic and supersonic aircraft are on the drawing boards and in laboratory stage. Some of them will resemble their slow brothers of today only as a needle resembles a mutilated cigar butt. Surprisingly, though, the new planes are beginning to look more and more like those paper planes you used to sail in the classroom. ☆

SPEED RECORDS



"There he comes," someone shouted excitedly, pointing at the gray horizon rimming the western edge of the field. At that moment it was only a pin-pointed speck, for those who could see it at all, and then—woosh! And it was a speck again, this time disappearing into the eastern sky. "You mean," someone else said, "there he went."

This interchange, repeated many times during the three-day press conference held by the AAF at Wright and Patterson Fields in Dayton, Ohio, on June 3, 4 and 5, was a literal description of the breath-taking, stomach-fluttering speeds reeled off during the course of the show.

Specifically, the conversation concerned the P-80 Shooting Star, flown by 1st Lt. Henry A. Johnson of Ulrichsville, Ohio, which at that instant had set a new fighter plane speed record of 462 miles an hour over the 1,000-kilometer (621 miles) course between Dayton and St. Louis.

The new P-80 record was the first of three made during the conference and show, two of which bettered records already broken recently by the same planes. All in all, the AAF currently holds 20 world records established in the six-week period up to and including the three-day conference at Dayton, according to a special announcement issued by Commanding General Carl Spaatz.

"These records," the General pointed out, "are the result of money spent during the war years for research, development and production of aircraft. Since it is anticipated that funds for a vigorous and intensive research and development program will be available in the future, the policy of the AAF will be to use aerodynamic advancements that will be applied in our future combat aircraft to break every possible international aircraft performance record."

The current records held by the AAF, he explained, were not established by specially built aircraft but, rather, by the standard, currently operational, production line aircraft stripped only of armament. At the same time he stated that the performance of these operational planes had already been exceeded by the newest US experimental fighters and bombers now flying, including the new Douglas designed B-42 Mixmaster and the jet-propelled Douglas B-43 which are far faster than the A-26, the new Boeing B-50 Superfortress which can out-perform the famed B-29, new jet-propelled fighters even faster than the P-80, and the Sikorsky R-5A helicopter which has already been improved.

Included in the total of 20 records now held by the AAF are 14 established in the Continental US, and six load-altitude records with B-29 aircraft based at Guam. All of the record flights, the General declared, have been run under supervision of NAA timers and according to regulations of the Federation Aeronautique Internationale.

The three new records established at Dayton during the conference are included in the 14 Continental US records already mentioned. In addition to Lieutenant Johnson's spectacular 621-mile dash in the P-80, two other records were made on the same day—opening day of the conference. These were the average speed of 361 miles an hour by a B-29 flying a 2,000-kilometer course between Dayton and St. Louis, and the average speed of 110.5 miles an hour by a Sikorsky R-5A helicopter over a measured 20-kilometer course. The helicopter flight broke the former world mark of 76.1 miles an hour set by Ewald Rohlfs of Germany in 1937 with a Focke-Wulf machine, while the B-29 flight bettered by 50 miles an hour the record established by a German Junkers 88 carrying a 2,000-kilogram payload.

The B-29 flight also contributed to the spectacular flavor of the day. Brilliantly flown by Capt. James M. Little of Brooklyn, N. Y., the Superfort had completed the last lap of the flight when a series of mishaps befell it:

The right outboard engine developed trouble. When Captain Little attempted to feather the propellor, it flew off, and smashed the propellor of the right inboard engine. This propellor in turn tore a six-foot hole in the fuselage of the plane, immediately releasing the pressure which had kept the cabin fit for the 30,000-foot altitude at which the record flight had been made, and severed the rudder controls. Meanwhile, fire broke out in the left outboard engine which also had to be feathered. As if this were not enough trouble for one plane in one day, the Superfort had to make a crosswind landing with only one engine, over-ran the runway, blew one of its big tires, and brought up safely.

Records now held by the AAF are:

One-hundred kilometer (62 miles) low-level speed run, April 19, in a P-80 flown by Capt. Robert A. Baird III of Wright Field, at 495 mph, breaking the record of 394 mph previously held by Maj. Gen. Ernst Udet of Germany in a Heinkel 112.

The 1,000 and 2,000-kilometer records, April 19, in a P-80 flown by Lt. J. J. Hancock at an average of 440 mph, breaking the record of 325 mph previously held by Italy.

Six records made by a B-29, flown by Lt. Edward M. Grabowski, May 17, over 1,000 and 2,000-kilometer courses with varying payloads.

Two records made by a B-29, flown by Capt. John D. Bartlett, May 17, over a 2,000-kilometer speed course with a 10,000-kilogram handicap payload, averaging 358 mph for the 1,000-kilometer run and 356 mph for the 2,000-kilometer run, breaking the respective records, previously held by Italy, of 207 and 205 mph.

A helicopter duration flight by 2nd Lts. William L. Vavricka and Kenneth R. Bloom, May 13, in a Sikorsky R-5 helicopter, for nine hours, 33 minutes and 27 seconds, breaking the record of one hour, 32 minutes previously held by Igor Sikorsky flying a Vought-Sikorsky helicopter.

A helicopter distance record by the Sikorsky R-5 helicopter, flown by Maj. Frank T. Cashman, May 22, in a non-stop flight from Dayton to Boston.

A helicopter speed record by a Sikorsky R-5A, flown by Lt. Col. Keith S. Wilson, June 3, over a 20-kilometer course at an average of 110.5 mph, breaking the record previously held by Germany of 76.1 mph.—*Sgt. T. Strong Menkel.* ☆

News and Views around the World

CROSS COUNTRY

OPERATION: "CASEY JONES"

As Americans learned what it means to find their country in the paralysis of a general rail strike, the Army learned in one work-packed week what it can do to relieve such national emergencies with air transport.

Within 24 hours after the strike started, the Air Transport Command had launched Operation "Casey Jones," with 500 C-47 and C-54 transport planes serving every key area in the United States on more than 60 daily schedules. The carrying capacity of ATC's "strike fleet" was impressive—more than 1,000,000 ton-miles daily—with a second 500 transport planes already alerted to double this service. With rail transportation at a standstill and commercial air carriers already overtaxed, the country had turned to its one certain source of help—military air transport.

An air transport operation of such scope cannot be organized overnight, and wasn't. Its basis was the already established and experienced military air transport of ATC's Continental Division, which is the Army's agency for the scheduled air transport of military cargo and passengers. Continental Division transports, manned by high caliber crews fully familiar with America's air routes and airports, normally connect and serve all important Army installations, posts and depots. It was this organization, with its planes, its people, its traffic and communications facilities, and above all its "know how" in air transport, which made possible the swift, efficient expansion called for in the transportation crisis.

The ATC's strike activity lasted just one week. On Saturday, May 18, the ATC began its plan for the call which loomed ahead. By Wednesday it had decided that the Continental Division would quadruple its normal schedules and would further augment its airlift by assuming control over all AAF transport planes in the United States, particularly those of the Troop Carrier Command. It was decided also to bring these additional transports into 15 key assembly points, where they would remain on call.

By Wednesday night the Memphis Headquarters of Continental Division, commanded by Brig. Gen. William H. Tunner, was working on a high pressure, 24-hour basis. It was here, in the early hours of the crisis, that ATC's operation received its name, Operation: "Casey Jones." Detailed warning orders were teletyped to all air installations from coast to coast. Experienced traffic officers were flown to the 60 key cities where Army planes would pick up and deliver their loads. Certain reserve officers, experts in air transport, were called back to active duty. Three-million gallons of aviation gasoline were spotted at points along the air routes. To control the vast fleet as it moved across the country, three regional offices were established to channel requests from shippers and insure maximum utilization of planes.

In all planning and in all orders, greatest emphasis was on safe flying. Most experienced pilots were called first; later crews were to meet rigid qualification requirements. Airport and weather minimums were established. Parachutes were ordered for all passengers, and special instructions were issued for the loading and tie-down of cargo. The Continental Division believed it must accomplish its unprecedented assignment and still maintain its fine flying safety record intact.

This it did, without a single accident during the entire operation.

As the strike got under way, it was decided that the ATC's planes would first carry critical military cargo and passengers, then first class mail; and finally civilian shipments and passengers. The Army placed drastic limitations on its own traffic to make

American Thunderbolts are shown being hauled through the streets of Liverpool in RAF trucks for shipment home by boat after war's end.

maximum space available for other cargoes. It was also arranged that civilian shippers utilize the broad facilities of the Railway Express, which would determine priorities and arrange delivery and pickup with the Army operators. Both press and radio were used to inform the public that ATC's service was already in operation and how to use it. At every point ATC crews received all-out cooperation from other Army Commands, from the Navy, and numerous civilian agencies. For the duration of the emergency, the air belonged to ATC.

ATC completed numerous emergency missions throughout the country. It carried thousands of pounds of first class mail. It rescued shipments of butter and other foods, stalled along the rail routes and threatened with spoilage. It flew large numbers of Army and government leaders, moving across the country on strike business. It made several "mercy" flights, such as transporting a 12 year old child, suffering from brain tumor and stranded on a train in Arizona to a California hospital. And in two days it carried more than 1,000 high priority passengers.

FACTORY TRAINING

Special factory familiarization training will be available to a limited number of military and civilian personnel assigned as key instructors and maintenance personnel in order to insure top efficiency in the maintenance of aircraft.

Military personnel must be members of the Regular Army or officers who have volunteered to remain on active duty until June 30, 1947, or for the duration of the emergency plus six months.

FIGHTER PLANES GO HOME

At the Liverpool docks after the end of the war, huge 60-ton cranes lifted a 6¾ ton P-47 to the flight deck of a grain ship converted into a pocket aircraft carrier. These were the ships that doubled as baby flat-tops during the battle of the Atlantic. Afterwards these carriers transported Thunderbolts and Mustangs back to the States.

The planes were flown from their operational bases to Speke, near Liverpool, where they were disassembled, taped to protect them against the Atlantic weather and then mounted on special trucks for the overland journey to the Liverpool dockside, where they were loaded onto the pocket aircraft carriers.

After disassembly and taping, the planes were hauled through the streets of Liverpool to the docks by courtesy of the RAF which supplied the specially designed chassis, the trucks, the personnel and the "know how." This was a touchy business, for many spots on the eight-mile trip from Speke to the docks were made just wide enough to permit passage by chopping

down trees and moving light poles. No possible route could accommodate the wing span of either a P-47 or a P-51, so a "side-saddle" rig was contrived.

20-MILLION VOLT X-RAY

Defections in bombs and shells will be detected by a 20-million volt x-ray machine recently installed at the Picatinny Arsenal, according to US Ordnance officials.

The betatron, as the unit is called, will look through 12 inches of steel, revealing cavitation in a shell or bomb and any imperfection in the steel casings. Cavitation in a shell is highly dangerous. If the bursting charge does not pack tightly in the shell but leaves air bubbles and cavities, the shell will explode prematurely.

Because the unit is of such high voltage, a special building has been constructed to house the machine.

TALENTED ARMY AT BUCKLEY

Buckley Field has listed among its personnel a private named Saint Peter working in the post chaplain's office; Pvt. Frank Sinatra and Pvt. Tommy Dorsey, who cannot sing or play an instrument; Pvt. Harold Lloyd and Pvt. James Byrnes, basic trainees; Lou Boudreau, who is not on Buckley's baseball team, and Pvt. Lloyd Douglas who is too busy to write books. And in the hospital, Sergeant Chronic.

FAMOUS RAF BOMBERS TOUR AMERICA

A squadron of Lancaster bombers piloted by RAF war heroes will fly the Atlantic to take part in Air Force Day ceremonies on August 1.

Number 35 Squadron, Royal Air Force Bomber Command will leave in flights of four from Gravely to New York the first week in July. Ground crews will arrive by air in York transport aircraft. The squadron was operational during the greater part of the war and engaged in many of the major attacks against Germany. It was the only heavy bomber squadron to take part in the Royal Air Force's massed flight over London on Victory Day, June 8.

NURSE REPLACEMENTS

Replacements for Army Nurse Corps members eligible for separation or rotation are sailing from the West Coast for duty in the Pacific. Approximately 760 nurses are leaving in this shipment. Of some 57,000 nurses on duty on V-J Day, more than 42,000 have been separated from the service.

Army nurses are eligible for separation if (1) married (2) over 30 years of age (3) they have 14 months of active duty (4) their service rating is 25 points or more.

AAF OFFICERS TO TEACH ROTC

A total of 150 officers will be assigned as assistant professors of military science and tactics for duty with senior ROTC units to provide an adequate instructor force for the Air Reserve Officers Training Program.

A select group ranging from first lieutenant through colonel will be given advance experience in training such units. Air Corps officers who are in the Regular Army, temporary appointment Air Corps officers who have volunteered to remain on active duty indefinitely, or temporary Air Corps officers who have volunteered to remain on active duty until June 30, 1947 and have applied for Regular Army commissions are eligible.

They must also be rated pilots on flying status, acceptable to the colleges concerned and have efficiency ratings of "excellent," three years commissioned service and 12 months overseas service since Dec. 7, 1941.

IVY COTTAGES ON GUAM

Dependents of Guam Air Force personnel will be billeted in six or seven room white houses containing electric refrigerators, stoves and hot water heaters when they arrive on the island.

The 20th Air Force housing project, begun early this year, will eventually consist of 70 dwellings each with two or three bedrooms, a large porch-like living room, a bathroom equipped with sink and shower and a spacious kitchen. The buildings are to be constructed on a standard design with quonset hut foundations, roof and ribbing and a wooden porch addition. Each house will enclose 1,700 square feet of living space.

All dwellings will be serviced by centralized electricity, sewage and water facilities and will have telephones. Electrical connections will be underground. A sufficient supply of water is guaranteed by a large water tank already built and tentative plans for recreational facilities call for a swimming pool and other features.

Average time for completion of a home is 20 days and record time for completion of a single house is 14 days.

OCS STILL OPEN

The AAF's Officer Candidate School at San Antonio is still training men to assume commissioned duties upon successful completion of the four months course. In order to be eligible for selection to attend OCS, an applicant must have three months service, agree to remain in the Army for one year after date of commissioning unless sooner released by the War Department and must be at least 18 and not have passed his 35th birthday by graduation date.

The school is geared to accept 200 men a month but only 50 men have been entered in recent classes because of the scarcity of eligible men. Former officers who have reenlisted as master sergeants are not eligible to attend under a ruling in WD Circular 125, Sec. 4, dated 30 April 1946.

NEW BOOKS

WAR

GENERAL WAINWRIGHT'S STORY; THE ACCOUNT OF FOUR YEARS OF HUMILIATING DEFEAT, SURRENDER, AND CAPTIVITY. *Robert Considine.* The story of a great American who maintained belief in his ideals against hopeless odds. N. Y., DOUBLEDAY, 1946.

THE LAST TIME I SAW THEM. *Lt. Col. Corey Ford and Major Alastair MacBain.* The story of some remembered moments in the Air Forces. All royalties go to the Army Air Forces Aid Society. N. Y., SCRIBNER & SONS, 1946.

POST-WAR

THE ANATOMY OF PEACE. *Emery Reves.* A plea for universal law as the most urgent need of the world today. N. Y., HARPER & BROTHERS, 1946.

VITAL PROBLEMS OF AIR COMMERCE. *Lucien Zacharoff.* A clarification of many problems posed by international air transportation. N. Y., DUELL, SLOAN & PEARCE, 1946.

TECHNICAL

ELECTRONICS IN INDUSTRY. *George M. Chute.* Description and practical explanation of a wide variety of electronic equipment used in industry. N. Y., MC GRAW-HILL, 1946.

AUTOMOBILE ENGINES; CONSTRUCTION, CARE, AND REPAIR OF AUTOMOBILE ENGINES, CARBURETORS, AND COOLING MANIFOLD SYSTEMS. *Ray F. Kuns and Tom C. Plumridge.* Fundamentals of automobile engines. CHICAGO, AMERICAN TECHNICAL SOCIETY, 1946.

AUTOMOBILE FUNDAMENTALS; CHASIS AND POWER TRANSMISSION. *Ray F. Kuns and Tom C. Plumridge.* Covers construction, care and repair. CHICAGO, AMERICAN TECHNICAL SOCIETY, 1946.

UNDERSTANDING MICROWAVES. *Victor J. Young.* Fundamentals of microwave radio and radar, N. Y., JOHN F. RIDER, 1946.

THE RADIO AMATEUR'S HANDBOOK. *American Radio Relay League.* The standard manual of amateur radio communication. WEST HARTFORD, CONN., AMERICAN RADIO RELAY LEAGUE, 1946.

SCIENCE YEARBOOK OF 1946. *John D. Ratcliff.* A record of scientific progress during the war years. N. Y., DOUBLEDAY, 1946.

YEARBOOKS

These books are available to AAF personnel through the AAF Technical Library Service, which provides for technical libraries at all major installations. For a complete list of books so available, see TECHNICAL PUBLICATIONS FOR ARMY AIR FORCES TECHNICAL LIBRARIES, Book List No. 2, March 1945 and supplements thereto. These lists are compiled by the Technical Library Section, Personnel Services Division, Headquarters AAF. Personal copies of these books may be obtained from the publishers or retail bookstores.

AIR TECHNICAL COLLEGE

Establishment of an Army Air Forces Institute of Technology to furnish the AAF with highly trained regular and reserve officers to meet the aviation needs of the future was recently announced by Maj. Gen. Curtis E. LeMay, deputy chief of Air Staff for Research and Development.

The Air Institute of Technology which replaces the Air Corps Engineering School at Wright Field is on a much broader scale both in the number of students and the scope of instruction. The extension in the curriculum is mainly in the field of logistics as applied to procurement, distribution and maintenance of Air Force equipment through all service echelons. Specific courses are contemplated in nuclear physics and electronics for qualified students desiring specialization in those subjects.

The facilities of the aeronautical development center at Wright Field will be available to the institute. Staffed by civilian experts, professors and instructors, first classes are scheduled to begin on September 3.

Two basic courses will be offered. The first will feature a series of courses in fundamental engineering subjects with sufficient material in logistics to coordinate the problems of engineering with those of supply. The second will deal with fundamental principles of logistics and business methods.

Requirements for the first class covering the last year of college are three years of college work leading toward a B. S. or B. A. degree in a recognized college, high academic standing and an "excellent" in all military efficiency ratings. Applicants must be in the Regular Army or officers who agree to remain in the Army four years after completing the course.

Officers who wish to attend the first class which will graduate 350 officers have been instructed to submit application with a transcript of previous college work through command channels to Commandant, AAF Institute of Technology, Wright Field, Dayton, Ohio. ☆

HOW SHARP ARE YOU?

QUESTIONS

1. How many men are in the picture?
2. How many bombs are in the picture?
3. Only one man is wearing an overseas cap. True or False?
4. How many missions has the B-29 flown?
5. It has downed four planes. True or False?
6. How many bombs are on the dollies with wheels?
7. The cover is on the upper forward turret. True or False?
8. to 12. What is written on each bomb?

ANSWERS ON PAGE 43

QUESTIONS

on Policy and Procedure

Q. What is the status of Regular Army enlisted men in regard to attendance at Officer's Candidate Schools?

A. *Their status is the same as that of enlisted men of the Army of the United States. Qualified personnel are encouraged and given every opportunity to attend OCS. Applications for RA personnel are processed in the same manner prescribed for AUS personnel. (Sec IV, WD Cir 125, 1946).*

Q. May excess NCO Club property be sold to commercial organizations?

A. *Yes. Such sale may be allowed if handled in consonance with the best interest of the Government, but approval must first be obtained from the next higher echelon of command. (AAF Ltr 30-30, 30 Nov. 1945).*

Q. Has a "Medal of Freedom" lapel button been authorized?

A. *Yes. This button will be issued with future awards. All personnel who have been previously awarded the Medal of Freedom are entitled to the lapel button. Requisitions for stocks of these lapel buttons may be obtained from the Philadelphia Quartermaster. (Sec V, WD Cir 132, 1946).*

Q. May furlough credit be cumulative from one enlistment period to another enlistment period?

A. *No. Furlough credit is cumulative during one enlistment period only. Unused furlough credit may not be used thereafter. (Par 1b(2), AR 615-275, 5 Apr 1946).*

Q. May a Warrant Officer claim dependent allowance on a dependent step-parent?

A. *Yes. A step-parent who has stood in loco parentis to the person concerned at any time for a continuous period of not less than five years may be classified as a dependent. However, that step-parent-step-child relationship is deemed to be terminated by the step-parent's divorce from the blood parent. (Par 25, AR 35-4220, C3, 4 Apr 1946).*

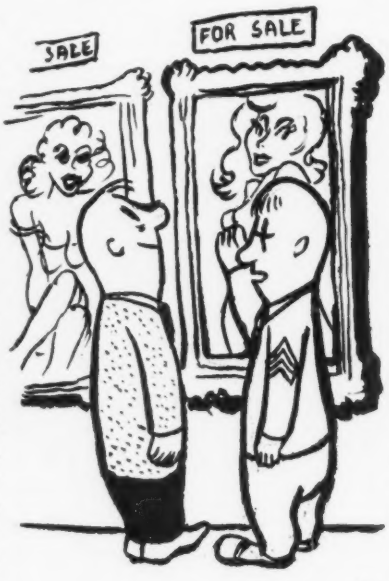
Q. If an officer graduated from aerial gunnery school in February 1944 is he qualified as an Aircraft Observer (Flexible Gunner)?

A. *No. He must have graduated from an AAF special service school subsequent to 20 April 1944 to obtain this rating. (Par 3j(4)(a), AAF Reg 50-7, 1 June 1944).*

Q. May soldiers who served as officers, flight officers, or warrant officers and then enlisted or reenlisted in the Regular Army claim enlistment allowance for the time they served in such capacities?

A. *Yes. Under the provisions of Sec 8, Armed Forces Voluntary Recruitment Act of 6 October 1945, all such continuous active service, if served under honorable conditions, may be credited toward enlistment allowance. (Sec 1371c-10, JAG, March 1946).*

Q. Is it true that a flight officer, acting as station salvage officer, does not have to furnish bond?



A. *No. Such flight officers must furnish a $5,000 bond unless otherwise directed by the Secretary of War in specific cases. (Par 7, C3, AR 35-220, 3 Apr 1946).*

Q. Isn't a soldier entitled to receive his naturalization certificate immediately after completing his processing for naturalization?

A. *No. The certificate will be delivered to his commanding officer who will make an appropriate entry in the service record. He will then file the certificate with the service record for safekeeping. After the soldier concerned is honorably separated from the service, the naturalization certificate will be delivered to him and his receipt obtained on his service record therefor. (Sec II, WD Cir 122, 1946).*

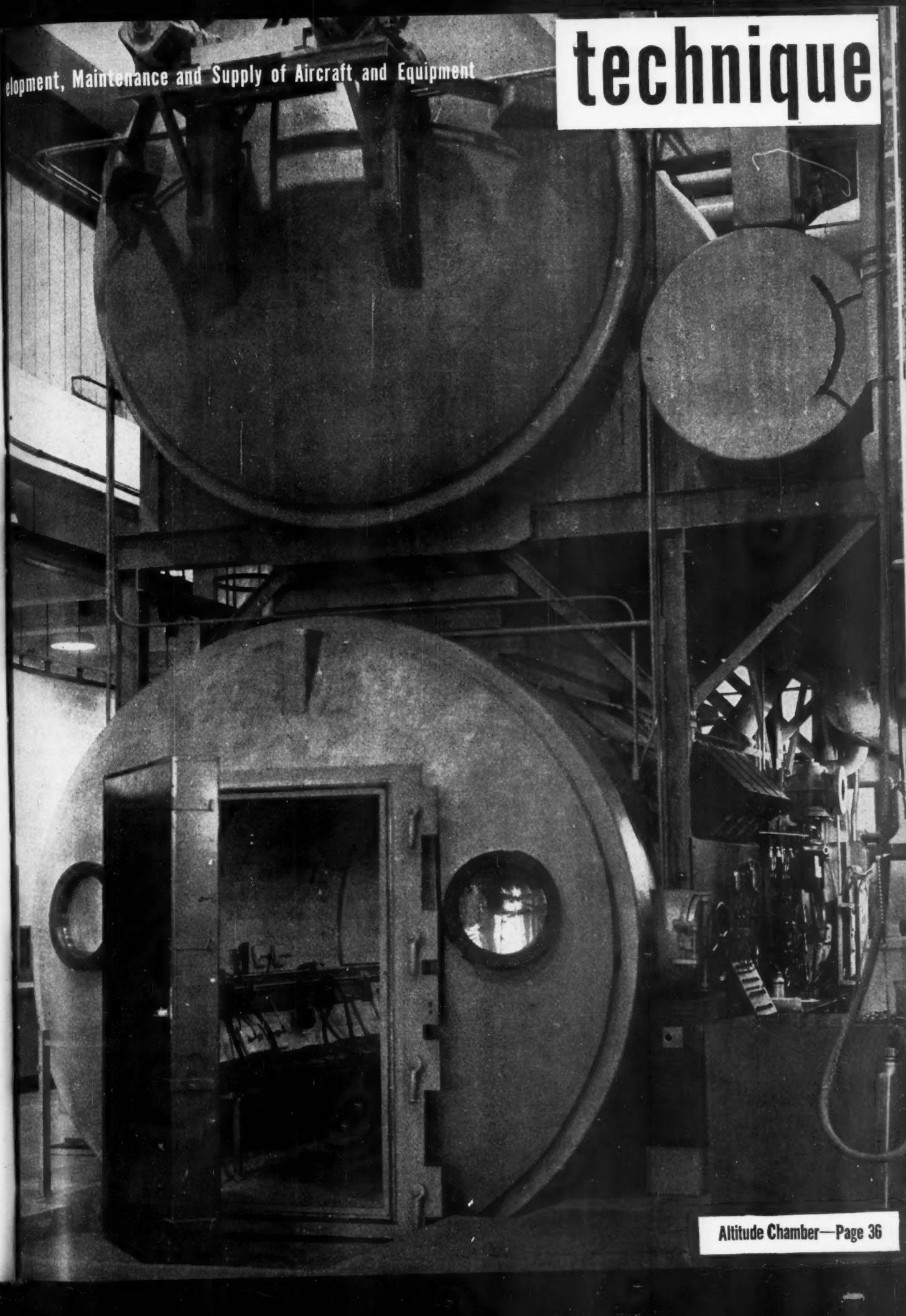
Q. What directives govern volunteering for airborne training?

A. *Physical qualification requirements for airborne training are prescribed by AR 40-100, 8 Apr 1946. Sec III, WD Cir 109, 1946, sets forth the officer and enlisted personnel who are eligible to volunteer for airborne training. This WD Circular also states the manner in which application may be made for such training.*

Q. When traveling by privately owned automobile on competent orders, may reimbursement be claimed for tunnel, bridge, and ferry tolls if the most expeditious route has been used?

A. *No. Such claim is precluded by the mileage allowance computations authorized by the act of 14 February 1931, 46 Stat. 1103. (25 Comp. Gen. 590 (B-54873) February 1946).*

technique



Altitude Chamber—Page 36

AAF's first jet propelled bomber, powered by two jet engines takes off after high speed taxi runs at Army Test Station, Muroc Air Base.

JET-PROPELLED BOMBER

A jet propelled bomber, the XB-43, first US bomber designed for jet engines, has successfully completed its initial flight test at Muroc Army Air Field, Calif., officials of Air Materiel Command announced recently. Tested under the supervision of AMC, Wright Field, and the Douglas Aircraft Company, the plane performed according to drawing board expectations.

Powered by two T G 180 jet engines, the XB-43 is of the same constructional design, modified slightly for the jet installations, as the Douglas B-42 which is propelled by two conventional type in-line pusher gasoline engines with one contra-rotating propeller. The jet engines in the XB-43 are located within the fuselage much in the same manner as the in-line engines in the B-42. Twin jet exhaust tail pipes replace the propeller in the tail of the plane.

The XB-43 can be compared in size with the more commonly known A-26, or the Invader, a light bomber, which was used so successfully during the war. The XB-43 is slightly larger overall and is heavier than the A-26. It has a wing of 71 feet 2 inches and is 51 and one-half feet from nose to tail. It has a retractable tricycle landing gear.

Although not tested to its maximum performance today, the XB-43 is expected to have a speed in excess of 500 mph with a very rapid rate of climb. Having a service ceiling of over 38,000 feet, the XB-43 is equipped with a pressurized cabin. Its service range is well over 1,400 miles.

NEW JET ENGINE

A new type high-altitude, high-speed jet aircraft engine is under development in the Wright Field experimental laboratories. Known as the ramjet, the engine is capable of operating at faster speeds and higher altitudes than any other present power plant with the exception of rockets. It is being developed as a possible answer to limitations of present engines.

The ramjet engine represents an ultimate in simplicity. In crude terms, it is a stove pipe with a fire in it. The engine itself, exclusive of the fuel system, has no moving parts and consequently no lubrication system. The ramjet utilizes the basic processes common to any internal combustion engine including the ordinary automobile engine. An automobile engine operates on a four-stroke cycle: (1) intake (2) compression (3) power (4) exhaust. In the ramjet there is first, intake and compression of air; second, combustion or heat release; third, expansion of air or power stroke. The complete cycle is applied to the air flowing through the ramjet in a continuous path with no interruption.

The fuel rates and output for supersonic flight are enormous, but if the problem of attaining speeds in excess of 1,500 miles per hour at altitudes up to and beyond the maximum for present aircraft is to be overcome, the ramjet appears to be the most suitable engine. The ramjet does not have effective power at low speeds, however, and requires another type of power plant or launching device to establish an operating speed.

The possible application of the ramjet lies in three fields. Its greatest suitability is for supersonic aircraft, either piloted or pilotless. Because of its light weight and ease of fabrication, it also may be used for subsonic expendable missiles. The third possible application is for rotary wing aircraft where rotor wing tips speeds may approach the speeds desired for ramjet operation and where the economy of engine weight and freedom from power transmission problems compensate for a higher fuel economy.

HIGH ALTITUDE CHAMBER

A new high altitude chamber at Cornell University's research laboratory Buffalo, N. Y., is one of the largest and most modern. With a length of 34 feet and an inside diameter of 10 feet, the chamber's refrigeration system permits varied operating conditions. Pressure altitudes of more than 67,000 feet temperatures as low as minus 85 degrees Fahrenheit can be simulated. It can "climb" faster than any present-day aircraft can equal.

All lit up and some place to go this taxi jeep guides night-operating aircraft at Kindley Field, Bermuda to parking aprons and take-off areas.

AIRBORNE RADAR INCREASES FLIGHT SAFETY

A considerable contribution to safety in flight was made recently when lightweight airborne radar equipment was employed on a scheduled transport operation for the first time on a C-54 which flew from Westover Field, Mass., to Paris.

This trans-Atlantic trip, supervised by the North Atlantic Wing of the Atlantic Division of the Air Transport Command, marked the first extended range use of lightweight airborne radar equipment installed and utilized for the purpose of aiding an aircraft to successfully complete a scheduled flight.

The high speeds of modern aircraft have increased the importance of pilots avoiding areas of dangerous turbulence, and lightweight radar is certain to help a pilot to orient himself further to weather conditions. The new development will aid in making flights safe in all kinds of weather.

The C-54 hopped from Westover Field to Washington and from there went on across the Atlantic to Paris. Shortly after the plane left Washington, the Patuxent River radar beacon appeared on the indicator, and this beacon remained on the scope until the aircraft had proceeded 135 miles past the North American coastline. After passing the range of that beacon, the plane's crew placed stress on recognition of cloud returns of various intensities, and as time passed, the pilot and co-pilot accurately read the remote scope and were able to alter the course of their flight so as to by-pass any front which indicated large amounts of moisture particles.

Pilot and co-pilot proficiency became so great they could predict, upon entering a cloud which returned a radar echo of even small or moderate intensity, the period of time which would elapse before the plane would break out into the clear. This was possible, crew members reported, because the pilots were able to measure the width of the cloud echo being returned for examinations on the radar scope.

Islands and coastlines were picked up on the scope at various degrees, depending on their sizes and shapes. Newfoundland and France were visible on the scope at ranges up to 45 or 50 miles. This was of particular benefit, for 90 percent of the trip found the C-54 flying either "on top" of the clouds or in the overcast, shutting out visibility. Another unique feature of the set was realized while on top, when surface vessels appeared on the scope, making further readings possible and permitting new ground speed, wind velocity and direction to be computed.

Designed and developed by the AAF during the war under the direction of Dr. Lee Durbridge and his associates at the radiation laboratories at the Massachusetts Institute of Technology, the new lightweight airborne radar will make the following major contributions to safety in flight: (1) The ability to "see" turbulence and dangerous storm conditions on the flight path and therefore to avoid them; (2) a method of accurate, short-range position fixing, made possible by employment of radar beacons; (3) an anti-collision device effective during instruments and night flying; (4) an obstruction warning device for the avoidance of mountains and other terrestrial obstructions; (5) an aid to navigation under instrument conditions for the location of islands, shore lines, rivers, lakes, cities and other prominent landmarks, and thereby of great use in enabling a navigator to compute drift, ground speed and correct headings.

This new celestial camera is an improved instrument permitting observations to be taken in obstructed locations and removing human error.

CELESTIAL CAMERA

The AAF has developed a new instrument that is expected to prove superior to the present equiangulator and pendulum astrolabe for determining geographic coordinates from star positions. The new instrument currently being tested by the 7th Geodetic Control Squadron, McDill Field, Fla., for use in AAF surveying activities, was developed by the Army Air Force Board at Orlando.

The XA-2 Zenith Camera is a geodetic control instrument that takes a picture of the celestial sphere at the zenith point of the position for which geographic coordinates are desired. The photographic plate exposed in the camera represents a gnomonic projection of a portion of the celestial sphere with the point of tangency at the optical center of the plate. From the star positions shown on the developed plate the geographical coordinates can be determined.

One of the principal attributes of the XA-2 is that it permits observations to be made in obstructed locations; also a complete observation can be made in 30 to 45 minutes with the new instrument while the present system requires from one and a half to three hours. By the use of a specially developed chronometer the possibility of human error inherent in the present system is eliminated. The new instrument also permits the operator to make photographs of stars whenever desired, while in visual operations the observation has to be made when the passage of the stars occurs.

Since stars seldom cross the true zenith, photographs are made of them in the immediate vicinity of the zenith. Two exposures are made of each plate, the plate being rotated through 180 degrees between the first and second exposures. Given two images of a star on opposite sides of the zenith, a point can be located and marked on the plate which is very close to the position of the true zenith. The approximate zenith mark can be located by connecting the two images of any star by a straight line. The mid-point of that line represents the approximate zenith. By further computation the true zenith can be determined.

The zenith camera can be utilized in areas of low latitude and sub-zero temperatures where the equiangulator and astrolabe are unsatisfactory. The camera is more portable, weighing only 28½ pounds with carrying case in comparison to the present instruments that weigh 70 pounds.

RADIO TELEMETERING

W ime development in radio-telemetering of test data from aircraft in flight has been announced by the Air Materiel Command. The purpose of the radio-telemetering system is to transmit electrically-translated measurements from a test airplane by radio to one or more remotely-situated receiving stations where the data may be continuously indicated and recorded. The system is intended particularly for use where exceptionally hazardous maneuvers are to be performed and where the test airplane is to be flown by remote control.

The present radio-telemetering equipment was developed at Princeton University under Project AC-40 of the National Defense Research Committee. Initiated at the request of the Engineering Division, AMC, the project's radio link is a modulated single-channel frequency operating in the vicinity of 70 megacycles. The total system, however, handles 18 separate intelligence channels by means of time division multiplexing in which high speed electronic commutators at the transmitting and receiving stations switch the several intelligence centers in regular sequence. Impulses transmitted from the airborne equipment maintain proper synchronization between the transmitting and receiving commutators. Each of the 18 intelligence channels is sampled 1,100 times per second, and the chopped signal in each of the 18 channels at the receiving station is integrated or filtered to produce a continuous time function of the particular measurement being taken on a test airplane. The 18 measurements are separately displayed on conventional panel-type instruments at the receiving station, and they are also simultaneously recorded on an 18-channel oscillograph.

Electrical pick-ups of variable resistance and variable-reactance types are available for use with the radio-telemetering system to measure acceleration, strain, pressure and other functions on the test airplane. The entire system is capable of reproducing faithfully both steady state and dynamic conditions of the measured quantity at all frequencies up to 100 cycles per second.

The present radio-telemetering system is capable of giving reliable results over any line-of-sight path up to approximately 20 miles in length, thus providing adequate range for performing vertical dives and other severe airplane maneuvers. Among the more important advantages of the system are the following:

A. Permanent records of the test data are preserved in the event of an airplane crash.

B. Engineers can observe important flight measurements as they are revealed on the indicating instruments at the receiving station and can signal for modification or cessation of the planned flight maneuvers whenever abnormal conditions appear.

C. The required amount of recording equipment is minimized because one receiving station can accommodate many separate flight tests in rapid succession.

D. Processing of flight records and evaluation of flight test results are expedited because the oscillograph film can be sent to the processing room even before the airplane returns to base.

Although the present radio-telemetering system is a practical facility for use in aircraft flight testing, numerous improvements of the system are planned or are in the process of development. It is expected that an increase can be made in the number of intelligence channels transmitted on the single radio-frequency carrier wave.

Reduction of size, weight and power requirements of the airborne components of the system are in prospect, and efforts will be made to increase the maximum distance range for fully effective use.

XP-84 PERFORMANCE REVEALED

The AAF's newest jet fighter, the XP-84 was revealed recently to have a speed of more than 590 mph, a service range of 1,000 miles and a service ceiling of more than 40,000 feet. At the first formal public showing of the XP-84, the Air Materiel Command announced that the Republic Thunderjet has been in the air more than 20 times since its initial flight on February 28.

A sleek, flush-riveted, highly polished aircraft, the XP-84 is about the same size as the P-80. Having a tip to tip wing span of 36 feet 5 inches and an overall length from nose to tail of 37 feet, the XP-84 is 1,000 pounds heavier than the Shooting Star.

Equipped with a tricycle retractable landing gear and powered by a General Electric jet engine, one of the most striking differences in outward design is the air scoop which is located in the nose of the plane instead of on the sides.

Among other features listed are the jettison-type bubble canopy which is electrically operated and permits the pilot to open the canopy at all air speeds prior to an emergency exit; a specially constructed pilot-ejection seat to provide emergency exits at high speeds; a pressure cabin fully air-conditioned to relieve pilot fatigue; and provisions for carrying wing-tip mounted external fuel tanks to obtain maximum range with minimum increase in drag. The rear section of the fuselage is quickly removable to permit complete replacement of the engine in 50 minutes. The Thunderjet also features a new Republic-designed high-speed, thin airfoil.

Tests on the first XP-84 prototype are still underway at the AAF test base at Muroc Dry Lake, Calif.

LIFE SAVING BUOY

An Army Air forces locator buoy—powered by a Signal Corps sea-water battery—is credited with saving the lives of many flyers during the war and is now standard military aircraft equipment, it was revealed recently.

A number of instances are recorded in which downed airmen tossed the buoy from their life rafts into the ocean and saw emerge a rodlike antenna which began to transmit radio signals

The AAF's newest jet fighter, XP-84 Thunderjet, has a jettisonable canopy for safety.

in all directions. Other planes within a radius of 50 miles could pick up the signals and, by radio direction finding equipment, locate the source of the signal.

The same apparatus serves to establish rendezvous points for aircraft over the ocean areas. In that use, the buoy is dropped from a plane by parachute over the desired meeting place. After the buoy hits the water and bobs to the surface, the antenna is "shot" upwards to its extended operating position by the explosion of a .30 caliber blank cartridge. After an interval of about 10 minutes, radio signals are transmitted for a short test period. The transmitter then cuts off and remains quiet until a timing device set at the designated hour switches it back into operation. Planes coming within the 50-mile effective radius of the set may be "homed" by their radio direction finding equipment to the rendezvous point marked by the buoy transmitter.

A small but powerful radio transmitter for the locator buoy was first devised, but the real problem lay in supplying a source of electric energy. Since the equipment had to be as small and light as possible to render it portable and permit it to remain afloat for a long period of time, bulky generator equipment could not be used. The only other applicable source of power was a battery.

What apparently appeared to be a simple solution to the problem, proved to be difficult. Although batteries seem to answer the needs of ordinary electrical requirements, they have serious limitations when applied to special purposes. In this case the difficulties were serious. First, the battery had to supply sufficient power to operate the transmitter, yet be small enough to fit into a seven-inch cylinder. It had to be capable of being stored for long periods of time without deteriorating, and had to be ready for instant use. As emergency equipment, the locator buoy would be kept on hand like a fire extinguisher, and when used would have to be hastily dumped overboard with a minimum amount of preparation. It was essential, moreover, that the battery be capable of providing the necessary current under all temperature conditions in climates ranging from arctic to the tropics.

The job of developing a battery answering all these requirements was assigned to Signal Corps Engineering Laboratories, Fort Monmouth, N. J. Working in collaboration with several industrial concerns, the laboratories developed a sea-water activated battery which in its own right was as ingenious a development as the miniature radio transmitter. For in this application use was made of sea-water which as a highly corrosive agent ordinarily injures equipment immersed in it. In this case, sea-water was actually employed to activate the battery, to form the electrolyte or acid solution which, in reacting chemically on the plates of the battery, creates electric energy. Common tap water may also be used.

In the investigation of electrochemical combinations for batteries, it was found that a sea-water activated battery answered best the requirements of a power supply for the floating radio transmitter. This type of battery consists of five cells housed in a steel container in a pentagonal arrangement around a central hole through which the radio antenna extends. The outer case is cylindrically shaped, being about 7 inches in diameter and 10 inches in length. The positive electrode is made of magnesium; the negative consists of a coating of silver chloride on a silver screen. The battery is activated by water entering through a hole in the jacket. Another hole permits the escape of gases formed during the generation of electricity.

P-82 NIGHT FIGHTERS

There has been some argument as to what plane was first used as a night fighter and as to the effectiveness of the various ones, but there is little doubt that the AAF's night fighter version of the P-82 or "Twin Mustang" is the best of a long line.

The night fighter, when stripped down to its skeleton, is a plane with heavy, concentrated firepower, gasoline capacity for long range, manned by a pilot and a radio observer and able to make and keep contact with the enemy through use of radar aids as well as visual contact. Specially adapted to furnish air defense at night or during periods of low visibility in the daytime, it is more flexible than anti-aircraft and able to defend a larger sector. In addition to its defensive

P-82 Twin Mustang night fighter is noted for its great versatility.

mission however, the same night fighter must prove effective as an intruder, slipping over enemy territory to attack trains, airdromes, bridges and other installations of military importance.

From the beginning, the P-82 has been noted for its versatility, but as a night fighter it has no peer. All control mechanisms were removed from the right hand cockpit and in their place was put an amazing array of radar scopes and controls and instruments. Most of the equipment carried in the P-61 is to be seen here with a few new wrinkles added. The APN-1 Radar Altimeter and the SCR-720 are two of the sets carried. The Radome is mounted on the section that joins the two fuselages.

In this modification to a night fighter, the pilot was not forgotten. One pilot can get mighty tired after a stretch of nine hours or more of patrol, so a GR-1 auto-pilot has been installed.

Powered with 2300 hp Packard V-1650-23 & -25 engines, capable of pulling 90 inches mp in combat, and using 11-foot Aero-Products full feathering props, this sleek ghost of the night reaches speeds near 500 mph. It can climb on one engine, which gives a good safety factor, but with both engines the rate of climb approaches 7,000 feet per minute. It has a top service ceiling of 45,000 to 48,000 feet.

For armament the "Twin Mustang" carries six 50's and 20 rockets if necessary. By attaching two 310 gallon wing tanks it has a range of more than 5,000 miles and can remain airborne over nine and one-half hours. There seems to be no limit on the top gross weight this plane can handle.

G. I. BEAU BRUMMELS

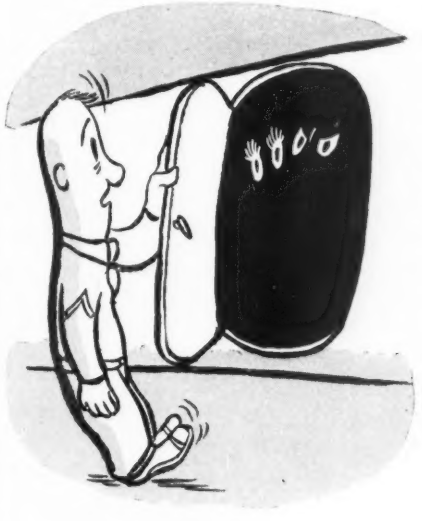
Under a personal directive of the Secretary of War, the Army is taking steps to insure that every new recruit steps out of the reception center a trim, well-tailored soldier, unlike his "sad sack" predecessor.

All commanders have been directed to see that in cases of original issue more attention is given to the fitting of the soldier with the correct size from the variety of sizes supplied by the Quartermaster Corps. When there is no appropriate stock in size, or those sizes in stock do not fit the individual properly, Army regulations prescribe that necessary alterations be made.

In the cases of men already in service, necessary steps are to be taken to call in uniforms with a poor fit and to issue more appropriate clothing.

tech topics . . . about aircraft and equipment

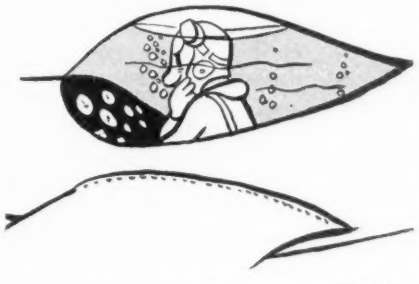
Another new training device is called the Attitude Visualization Trainer. Its purpose is to provide an improved method of teaching and standardizing instrument and contact techniques. The trainer consists of a standard Instrument Flying and Landing Trainer, modified to include a new weather hood and motion picture pro-



jection mechanisms for portraying the horizon on the cockpit windows. Projected images are synchronized with the attitude of the trainer to show relationships to the horizon in climbs, glides, banks and turns.

The light-weight oxygen generator developed in part in the Massachusetts Institute of Technology is now undergoing tests. This unit weighs 5,000 pounds complete and is substantially automatic in operation. The generator is made up of a unit composed of a driving engine and a compressor, and another separable unit containing the fractionating column and an expansion engine. Each unit can be airborne.

Because moisture can seep into aircraft instruments and render them inaccurate, a special Condensation Reducer has been developed by the Curtiss Aircraft Com-



pany and is now under tests at Wright Field. The gadget consists of two parts, one a moisture capsule which absorbs moisture when the plane is not in flight, and the other a condensation reducer which prevents the moisture from entering the instruments when the plane is at altitude.

A special mount in the nose of one B-17 airplane permits installation of a new type German camera that has many outstanding features. It uses 35mm film and operates on photo flash bomb principles without the use of a shutter. Film speed is controlled so that the entire flash period may be utilized instead of using just the peak light intensity common to American-built cameras. Another novel feature is the method of loading film. Instead of a conventional removable magazine, the film is dark-room loaded in a light-weight cassette which can be placed in, or removed from, the camera either before or during flight. This makes it possible to drop the exposed film to field laboratories by parachute.

A new blister-gunner's belt has been perfected to protect the individual in the event of sudden decompression. The belt consists of a waist belt and shoulder strap incorporating a quick release. Shoulder straps are anchored to the floor of the aircraft by a parachute snap-fastener down in his seat while not at the gun sight station, thus allowing him to remain in the harness at all times throughout the flight, not merely during the period he is at his guns.

A shoulder harness for glider occupants has also been developed. It is designed to prevent back injuries sustained by troops when they are thrown forward during shock landings. The harness protects the body from violent movement forward reducing the possibility of injury.

The Army recently tested a new light-weight automatic radio compass, with the loop antenna housed in a special, extremely lightweight plastic bubble. It recorded only six-tenths (.60) points drag at 180 mph. Only four inches in diameter, the new loop is the smallest ever produced, yet it has greater sensitivity than the larger loops now in general use.

AAF'S OLDEST

(Continued from Page 21)

LUFBERY, RICKENBACKER, QUENTIN ROOSEVELT WERE AMONG THE AERIAL HEROES OF THE FIRST PURSUIT GROUP DURING WORLD WAR I.

months before the existence of the new jet was made public in the United States. In small groups the flyers were permitted to examine the jet planes while a Wright Field officer explained their capabilities. The jets were closely guarded day and night. Flyers from nearby bases, including the RAF, came over to inspect these sleek gray sky sharks. Test flights of the P-80s were observed with awe and admiration. Italian peasants were amazed at the Shooting Stars roaring above the yellowing wheat fields.

Col. Milton H. Ashkins, who had become group commander, often was asked: "Are we going to get jets?" After V-E Day, when the Group began a training program preparatory to deployment to the Far East, many felt certain they would fly P-80s against the Japanese. Atomic bombs that fell on Japan, ending the war in mid-August, blasted the hopes of the boys. The Group moved September 15, 1945 to Camp Marcianise near Caserta. For a short period it operated C-47s over the Italian peninsula, transporting Air Force personnel to rest camps and replacement depots. High point officers and men were screened rapidly and sent home. Quickly, the Group went down to zero strength, the writer packing up in waterproof packages its war diaries, journals and mission reports, along with other Group records, and turning them over to the Historical Section of MTOUSA in the King's Palace at Caserta. A few of the pilots elected to transfer to the ETO for assignment in the Occupational Air Force. The rest of the personnel returned to the United States, some after being away three years. And so ended the Group's participation in World War II.

* * *

What were its accomplishments in these three years of war in the Old World? Here are the figures: Flew 1,405 missions totaling 20,955 sorties; it shot down in aerial combat 435 enemy aircraft, plus 100 more probable victories. On the ground it destroyed at least 149 German and Italian aircraft. Besides, it blew up many key bridges, destroyed enemy locomotives and rolling stock, wrecked and set fire to scores of enemy motor transport, took part in many air-sea rescues and escorted many supply-dropping missions. All this was not without cost to the Group. Operations in the European and Mediterranean theaters took a toll of 204 pilots either killed, captured or missing in action. Only a small contingent of the total actually survived. In addition, aircraft accidents were fatal to 28 more pilots. There were ground personnel losses also.

* * *

V

As related at the outset, the First Pursuit Group went into action early in May 1918. Earlier that spring the German Armies had lunged toward Paris in a last desperate gamble to win the war before the AEF could get into position to strike back. They came very close to succeeding before they were stopped by the American Marines at Chateau-Thierry, a score or more miles from Paris.

Although the Germans had air superiority and faster aircraft, the Group rose daily to give battle as the enemy's juggernaut ground slowly to a standstill. It was during this phase of the conflict that the Group won the first campaign star, that for the Champagne-Marne battle. Marshal Foch applied what became known as a pincers to the big German bulge and in the Aisne-Marne offensive forced them to withdraw. The Germans formed in the summer of 1918 their famous Hindenburg Line.

Lufbery jumped to avoid flames.

In the battles of Saint Mihiel, Verdun and the Meuse-Argonne, the AEF cracked the Hindenburg Line, forcing the German armies to retire toward their own frontier. In these battles the Group won more glory.

Major Lufbery, acclaimed as the originator of many of our fighter tactics, including the famous Lufbery Circle, was the commanding officer of the Group when it began its combat tour in May 1918. Major Lufbery had served almost four years in the French Air Corps and in the Lafayette Escadrille. He had shot down 17 Hun aircraft before the American Air Service began active work at the front. An account of his death shortly after he took over the American unit has been told by Captain Rickenbacker.

Lufbery had been watching an aerial battle between a German Albatros and Lieutenant Gude of the Group over the battle lines. Apparently, Lieutenant Gude, in his first air fight, had beaten the German. The Albatros, however, recovered and was heading toward the German lines. Rickenbacker's narrative follows:

"In the meantime, Major Lufbery, who had been watching the whole show from his barracks, jumped on a motorcycle that was standing in the road and rushed to the hangars. His own plane was out of commission. Another Nieuport was standing on the field, apparently ready for use. It belonged to Lieutenant Davis. The mechanics admitted everything was ready and without another word Lufbery jumped into the machine and immediately took off.

"With all his long string of victories, Lufbery had never brought down an enemy aeroplane within the Allied lines. All 17 of his early successes with the Escadrille Lafayette and his last success—when he had gone out to avenge Jimmy Hall—all had been won across the German lines. He had never seen the wreckage of a single one of his victories. Undoubtedly he seized with impetuous abandon this opportunity of engaging in a combat almost within sight of our field. Knowing nothing of the condition of his guns nor the small peculiarities of his present mount, Lufbery flew in to the attack.

"With far greater speed than his heavier antagonist, Major Lufbery climbed in pursuit. In approximately five minutes after leaving the ground he had reached 2,000 feet and had arrived within range of the Albatros six miles away. The first attack was witnessed by all our watchers.

"Luf fired several short bursts as he dived in to the attack. Then he swerved away and appeared to busy himself with his gun, which evidently had jammed. Another circle over their heads and he had cleared the jam. Again he rushed the enemy from behind, when suddenly old Luf's machine was seen to burst into roaring flames. He passed the Albatros and proceeded for three or four seconds on a straight course.

"Then to the horrified watchers below there appeared the figure of their gallant hero emerging in a headlong leap from the midst of the fiery furnace! Lufbery had preferred to leap to certain death rather than endure the slow torture of burning to a crisp. His body fell in the garden of a peasant woman's house in a little town just north of Nancy. A small stream ran by at about a hundred yards distant and it was thought later that poor Lufbery seeing this small chance for life had jumped with the intention of striking water. He had leaped from a height of 200 feet and his machine was carrying him at a speed of 120 miles per hour! A hopeless but heroic attempt to preserve his life for his needy country!"

In World War I, pilots did not wear parachutes. They had no opportunity to bail out, and when the planes caught fire in combat they either jumped or rode down to earth in flames.

Captain Rickenbacker became commander of 94th Squadron September 25, 1918. He celebrated it by shooting a "double" that day. He tells of the engagement: "Early that forenoon I started for the lines alone, flew over Verdun and Fort Douaumont, then turned east toward Etain. Almost immediately I saw a pair of LVG two-seater machines below me. Five Fokker machines were above them and somewhat behind, acting as protection for the photographers."

Climbing into the sun, Rick was soon in position to attack. He headed for the

AAF'S OLDEST

nearest Fokker. "I had him exactly in my sights when I pulled both triggers for a long burst. He made a sudden attempt to pull away, but my bullets were already ripping through his fuselage and he must have been killed instantly. His machine fell wildly and crashed just south of Etain."

The four Fokkers remaining were caught by surprise. "When I saw the effect of my attack upon the four dumbfounded Boches, I instantly changed my tactics, plunged straight through their formation to attack the photographing LVGs ahead," he continued. The ace maneuvered to get in lethal shots at the German recons, but the pilots were giving their gunner-photographers a crack at their adversary. "All the time we were getting farther and farther back into Germany. I decided upon one bold attack and if this failed I would get back to my own lines before it was too late.

"Watching my two adversaries closely, I found an opening. They were flying parallel to each other not 50 yards apart. Dropping down in a sideslip until I had one machine between me and the other I straightened out, leveled my Spad and began firing. The nearest Boche passed directly through my line of fire and just as I ceased firing I saw him gush forth in flames. Turning over and over as he fell, the LVG started a blazing path to earth just as the Fokker escort came tearing up to the rescue. I put on the gas and piqued for my own lines."

It is, of course, well known that Rickenbacker was America's leading ace in War I. There were many other noted pursuit pilots in the Group in addition to those referred to earlier, including Lt. Reed Chambers, Lt. Charles Chapman, Lt. Jimmy Meissner, Lt. Walter Smyth, Lt. Douglas Campbell, among others.

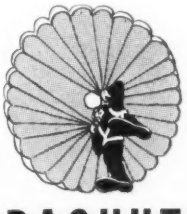
The Group was first equipped with Nieuport biplanes and later with the more efficient Spads. The latter type aircraft gave the Group an even break with the Fokker planes with which Richthofen and his Flying Circus were equipped. American air victories mounted rapidly in the autumn of 1918 as the Allies eventually gained control of the air. The last victory of the first war was scored on November 10, 1918 when Major Kirby shot down a Fokker in the vicinity of Manecourt. Its record during the seven months of combat is one that has seldom been equalled. The pilots engaged in 1,413 battles, shooting down 211 enemy aircraft and balloons.

The Group was inactivated on Christmas Day of 1918. But it was not to remain inactive long. Returning to the United States, it was re-established March 8, 1919 at Selfridge Field, Mich., under the command of Lt. Col. Davenport Johnson. Its combat elements consisted of the 27th, 94th and the 417th Aero Squadrons. In August of that year the Group went to Kelly Field, Texas, where it remained until July 1, 1921. It was then transferred to Ellington Field where it operated the Advance Pursuit Training School. At that time the 147th was named the 17th Pursuit Squadron.

In the years of peace the Group was an instrument for testing new equipment, training personnel and pursuit tactics. The squadrons of the Group participated in the National Air Races and the Mitchel Trophy Races established by the late General William Mitchel in memory of his brother, Lt. John L. Mitchel, one of the pilots of the First Pursuit Group.

In the decade preceding the outbreak of World War II, the Group was equipped with several types of pursuit aircraft which the old timers will remember well. Among them were the P-6 of Curtiss, Boeing's P-16 and P-26, the PB-2 of Consolidated, Seversky's P-35, the P-36, another Curtiss aircraft and Republic's P-43. Lastly in July 1941 the Group received some of Lockheed's P-38s, the type the Group operated throughout War II.

General Brett, then a major, became Group commander in 1930. Four years later the late General Andrews, then a colonel, succeeded Brett. He was followed by Col. Henry B. Clagett and Col. Larry P. Hickey, who have since retired. At the outbreak of the war the Group was under the command of Maj. Robert S. Israel who became Brigadier General in command of the 62nd Fighter Wing at Leghorn, Italy. Col. John N. Stone and Col. Ralph S. Garman were among the Group leaders in the ETO and North African campaigns. Many of the Squadron leaders rose to eminence during the late war. ☆



PARACHUTES LOST

42-688918A 44-165588B
42-874500A 42-267669C

Return to field indicated by letter after number as keyed below

A—320th Troop Carrier Sqdn. RAAF, Roswell, N. M.
B—MAAF, Midland, Texas.
C—Personal Equipment Laboratory, Wright Field, Dayton, Ohio.

Answers to "How Sharp are You"

Photo on Page 2
Questions on Page 34

1. Seven
2. Five
3. True
4. Twenty
5. False
6. One
7. False
8. Tokyo Busters
9. Jane
10. Marge & Jay
11. David & Irene
12. You'll get a bang out of this one. (Babick, Tennis, Ziv.)

PROJECT RUBY

(Continued from Page 6)

and powerful rocket which cuts in 5,000 feet above the target and enormously increases the speed of the bomb's descent.

Let's go along on a Disney mission and see how it's done. We are up at 0730. Breakfast is at 0800 in the RAF Officers' mess and briefing starts at 0830. The target for the day, the route to be taken to the target, the weather, the altitude for bombing and all the other details pertinent to the mission are revealed.

We go by jeep to the parking apron where the B-17 is being loaded with two of the Disney's externally hung since they are too long to be inclosed within the bomb bays. We have arranged for the bomb bay to be opened immediately after bombs away in order to get pictures of the target. Off we go! Low banks of clouds, gray and scudding, obscure the rich greenness of the East Anglia countryside. We climb slowly and steadily out and up, breaking into the clear blue sky above the cloud deck as we pass over the Channel. We fly to the Dutch Coast, along the time-honored route of many a flak-riddled wartime mission and turn almost 90 degrees down toward Bremen, passing high over Holland and Belgium.

The target is sighted and bombardier, navigator and pilot quietly go about the teamwork which turns the B-17 into a precision bombing platform. We listen on the intercom as the bombardier and pilot set up the intricate mechanism of autopilot and Norden bombsight. Soon it will be "bombs away." "Fifteen seconds warning!" We count. As we lean into the bomb bay from the radio operator's compartment, the plane lurches upward sharply. The doors open. The bomb is silhouetted against the bright landscape below. It vanishes. Seconds later a little plume of gray smoke shows against the side of the tiny oblong; far below that is the Farge submarine pen. We get the results on the command radio now!- A near miss. Once again the aircrew enters into its intricate, delicate teamwork. The plane again becomes steady as a floor. Seconds pass. The warning call is given. There is a short silence, the heavy lurch, and down goes the bomb almost out of sight. But this time it's different! Nobody has to tell us. There it is, a little plume, a long shadow, smack dab in the middle of the target! A dead center, aiming-point hit, with penetrating effect. Happily we whip up on one ear and circle down for a good look. It's a nice round hole, clean as if drilled, directly in the middle of the roof.

We head for home, over the route we came, this time at deck level, over the Dutch flatlands and past Belgian towns, with horses scattering and farmers waving at the now unfamiliar sight, back to England where the boys with the charts and graphs will immediately dope it out, and perhaps come up with some new answer, maybe THE ANSWER. ☆

Sandingham Castle reveals to our GIs the manner of medieval life.

ETO REC

The ETO doesn't have a monopoly on recreation. These boy

The Average GI Serving in Europe Opportunities to "Go Places

"I think I'll put in an application to go back overseas," an Air Force sergeant said recently in the lobby of a New York hotel. "I've been back in the States now for four months and I believe I can do a better job of soldiering in the ETO. Also see and do many of the things I did not have the opportunity to do while the war was going on and right afterwards."

The sergeant was talking with an Air Force officer whom he had known back in his home town. The officer asked, "So you think you would like it a lot better than the ZI?"

"Yes, there is a lot to do in Europe. True, it's different now than it was during combat days. You have to dress up, turn out smartly for formations and be on the ball generally. But after all, who wants to live in a foxhole and look like a tramp forever? Besides, the GI gets plenty of opportunity to see things; furloughs aren't difficult to get and, after all it's a darn sight cheaper to live there than to live here."

This conversation served to call attention to the observations made by an AAF REVIEW correspondent who visited USAFE Headquarters right after the V-E Day Anniversary. He made note of the fact that many recreation facilities have been opened to officers and men alike. Famous spas of the old world, art galleries, playgrounds are open to the soldier on ETO occupation duty. In addition, the Army is determined to make foreign duty as pleasant and as informative as possible, giving the average American GI, at a very nominal expense, the chance to see Europe in a manner formerly reserved for millionaires.

Since the end of the conflict, official emphasis has been placed on providing and improving recreational and living facilities. Travel and vacation tours are available where the soldier can spend anything from a 48-hour pass to a 15-day furlough. Army sponsored country clubs and resorts are springing into existence nearly everywhere. Sections of occupied cities are taken over by the Army to house the families of GIs coming to Europe.

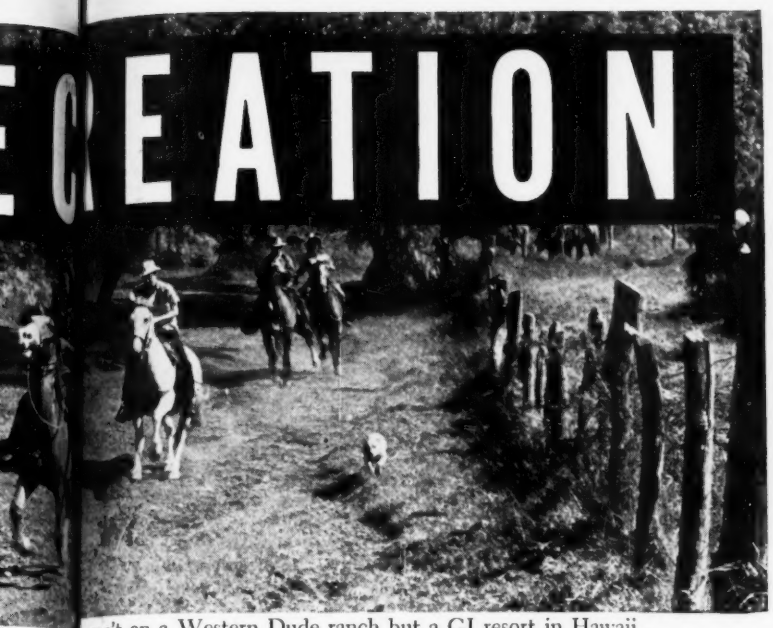
Cost to American troops for the various tours are nominal, $35 for Swiss tour, $20 for Paris tour, $39 for a trip to the Riviera. These prices include food and lodging for the entire excursion.

Trips to other countries and resort spots, however, are a relatively small part of the recreation facilities available to American Army personnel. The GI interested in literature, for instance, can trace the background of Hans Christian Andersen, visit the original sources and settings of the great

This Buddha is a famous display at Sandingham, England.

This officer's new home is the Neroberg Hotel, Weisbaden.

EATION



aren't on a Western Dude ranch but a GI resort in Hawaii.

heater Now Has Unparalleled
ee Things" In New Army Program

European novels of past ages. Students of art and sculpture have unlimited opportunities to roam in the continental cultural centers of Paris, Florence, Vienna and the many other European art centers. Music enthusiasts are in the very cradle of classical music.

For the sportsman who hates to leave rod and gun behind, facilities now open in Europe represent the ultimate in fishing and gunning. Complete equipment is available for fishing in the countless mountain streams and lakes, teeming with fish which knew few anglers during the war years. Hunting seasons have been opened on elk, deer, hare, fox, quail, pheasant and ducks. Guns and ammunition are there for the asking as are traps for followers of the trap line.

A touch of home is frequently in evidence as with the official Frankfurt, Germany area baseball league. A complete 45-game schedule for 1946 has been set up. Basketball leagues including WAC teams are a regular part of occupation routine, and the other American sports are becoming increasingly popular. With the summer season approaching, organized outings and hikes to nearby places of interest are increasing, given impetus by the many unusual and famous sights to be seen in all occupation zones.

Hiking over European hills is a new thrill on a bright Spring day.

Of course, movies are free and many of the latest features are shown. USO road shows touring the theater are still frequent attractions. Where interest is keen enough, dramatic playhouses set up by military personnel are prospering.

Special Services Division of the occupation forces is setting up its own country clubs. One such club at Oberursel, Germany, for example, has, in addition to a huge three story building with all club facilities inside, such added attractions as a steeplechase, archery range and a huge dance hall known as "The Barn" where dancing parties are held four nights a week.

Complete libraries are always available and book reviews are frequently scheduled. Symphonies and concerts by famous continental orchestras again coming into their own are open to occupation forces. Allied military and civilian personnel even have Masonic Club meetings, and other fraternal order organizations are on the upswing.

As everywhere else in the world the Army in the ETO occupation zone is not all play, but the recreational, educational and travel opportunities available to occupation troops are becoming the envy of many stateside soldiers. ☆

GIs and their pretty dates stroll along the Riviera.

Open carriage rides to historic Parisian sites are popular.

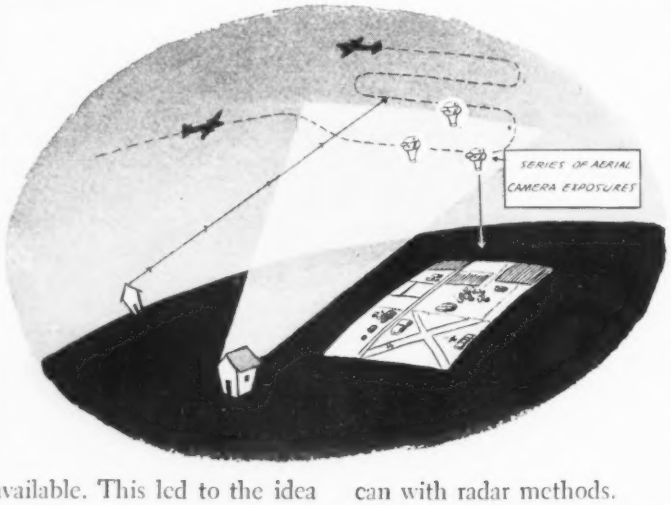
Precision Mapping With SHORAN

Looking forward to the new era of air travel that envisages stratospheric flights at supersonic speeds which will require precise navigation, the Army Air Force and the Corps of Engineers are engaged in testing electronic equipment that will locate any spot on earth in relation to any other spot within a few feet of perfect accuracy.

From tests and observations made during the war it has been found that existing charts and maps, which were drawn by astronomical calculations and with the equiangulator and pendulum astrolabe, are inaccurate in the location of areas because of the gravitational error inherent in these instruments.

Present surveying methods have to consider certain "unknown" and gravitational errors. These can be evaluated to a certain degree over land areas but in sea regions, beyond land reference, these unknowns are always in doubt. For this reason many of the islands in the Pacific and Caribbean area have never been accurately located on charts, but precision radar will be able to tie in oceanic islands with the land in such a way that there will be no doubt as to their actual location.

The new instrument currently being tested by the AAF is a type of precision radar called Shoran. (Shoran is a contraction of the words "short" and "range"). This instrument was developed and used during the war for bombing through the undercast or "blind-bombing." The accuracy obtained with this instrument was such, even with comparatively unskilled operators, that by V-E Day the amount of tactical bombing was predicated on the supply of Shoran equipment available. This led to the idea of using radar for map construction.



Shoran is based on the use of pulse amplitude, modulated high frequency radio waves transmitted by an airborne station, received and re-transmitted by an airborne station. Precise electronic timing makes the measurement of distances between the aircraft and the ground station possible. By means of two ground stations, the position of the airborne station can be determined by the solution of the triangle.

The primary purpose of applying Shoran to acronautical charting lies in the possibility of increasing the frequency of control and decreasing, if possible, the frequency of astronomical fixes. The chief failure of astronomical fixes is due to the deviation of the plumb caused by the gravitational pull of large land masses on the surveyor's plumb bob. Next in importance is the possible use of Shoran to fly straight lines, thus preventing excessive overlapping and the failure to obtain complete coverage. Equally important is the use of Shoran to establish a triangulation network which can be adjusted over control points established by astronomical means, thereby reducing the error due to local deviation of the plumb.

Not only has Shoran proved to be more accurate in locating positions in relation to others, but it provides a means for rapidly establishing suitable horizontal control data for map construction from aerial photography of areas not readily accessible to ground survey. Since Shoran measures great circle distances without physical contact with the earth, except for the initial placement of the portable Shoran relay-transmitting-receiver unit at about 500-mile intervals over the territory to be charted, no person of the party need ever see the area. With this method it is now possible to chart large areas, and to establish pin-point fixes without ever traversing the ground below.

In using Shoran for acronautical mapping, two ground stations are set up at 200 to 330-mile intervals and a plane is equipped with the airborne system. The airplane, flying at pre-determined angles from these stations, transmits radio signals to the two ground stations of the system where they are immediately re-transmitted back to the airplane along the same path. By automatic measurement of the time required by a radio signal to traverse each round trip path, the airplane equipment obtains an accurate figure of distance of the plane from each ground station. Since these radio signals, at sea level, travel with the speed of light (186,218 miles per second) the accuracy of the plane's location is almost perfect. The two-circle fix principle locates the plane by means of these two distance measurements only. On this fact depends the superior precision of Shoran, which cannot be approached by systems that depend on measuring a radio-path angle, or azimuth. Such angle measurements cannot be made with nearly so great accuracy as distance measurements can with radar methods.

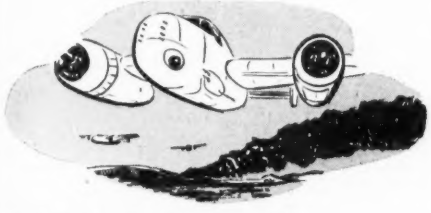
A Shoran-equipped plane can make aerial photographs from precisely known positions by using an aerial camera having a stabilized plumb point indication and automatic shutter. The details of this plan can be carried out in many ways, but the net result is a form of photographic reconnaissance, which can furnish highly accurate absolute-position information for use in mapping, gunfire direction, tactical planning and aerial bombing. This is accomplished without having to establish "control points" (points with known absolute position) in the area photographed.

At the present time Shoran ranges are predicated on the optical or line-of-sight range since radio waves travel approximately a straight line and do not follow the curve of the earth. The maximum range of the present Shoran equipment depends on the height of the ground stations and the altitude of the cooperating plane. For instance, a ground station with a 200-foot elevation and an airplane flying at 35,000 feet altitude would have approximately a 285-mile Shoran range. At 12,000 feet altitude the Shoran range is about 173 miles. With higher elevations for ground stations and higher altitudes for planes the Shoran range increases, while with lower elevation and altitudes the range decreases. But even with a 500-foot altitude a plane has a Shoran range of 42 miles. ☆

BATTLE HONORS

462nd Bombardment Group (VH)
20th Air Force

Twice in a 48-hour period the 462nd Bombardment Group (VH) struck the heavily defended city of Tokyo. These strikes contributed materially to the destruction of 221 square miles of vital industrial areas. Three days later, 29 May the Group participated in a daylight attack on Yokohama which destroyed 6.9 square miles of strategically important industrial area. Besides accurate and intense antiaircraft fire, the Group was subjected to attacks by more than 75 aggressive enemy fighters, destroyed 15 of them and probably destroyed three others. Ground personnel worked day and night to make these strikes maximum efforts.—23-29 May 1945.



42nd Bombardment Group (M)
13th Air Force

Operating in support of the Australian invasion of the Japanese oil refinery center at Balikpapan, Borneo, Netherlands East Indies, the 42nd Bombardment Group (M) carried out bombing and strafing strikes against enemy shore defenses and other installations. Because each of these round trips, among the longest-range combat missions ever flown by mass formation of medium bombers, involved a flight of more than 1,700 miles over open sea, it was necessary to use radio compartment fuel tanks and to make pre-mission experiments to determine the feasibility of loading the aircraft to such an extent. Taking off from a damaged runway and encountering tropical weather fronts the B-25s flew to heavily defended Balikpapan without the loss of a single crew member or plane. The group which dropped over 460,000 pounds of bombs and used 415,000 rounds of ammunition destroyed gun positions, warehouses, road blocks, fuel and ammunition dumps, a radar station, numerous vehicles, 73 military buildings and huge stores of gasoline and oil.—23 June—30 June 1945.

444th Bombardment Group (VH)
20th Air Force

Braving the danger of falling bombs from one of its own disabled aircraft, the 444th Bombardment Group (VH) staged one of the most accurate daylight precision bombing raids against the Japanese Empire. Aircraft of the group pin-pointed 248 tons of 4,000-pounders on the Sumitomo light metal industries plant in Osaka. At the end of the bombing siege, the Sumitomo works was 95 per cent destroyed.—24 July 1945.

26th Photo Reconnaissance Squadron
5th Air Force, 6th Photo Group

At the time when the Sixth Army in the Philippines vitally needed photographs of enemy installations and escape routes, the 26th Photographic Reconnaissance Squadron pressed all available pilots into service to carry out 25 photo missions to cover all key Jap positions in Luzon. Personnel of the photo lab processed over 2,000 negatives and the following day delivered 9,000 urgently needed prints. Much of the credit for the success of the day's mission, which contributed to the effectiveness of the Sixth Army's operations against the Japs on Luzon belongs to the ground crews who prepared the planes in spite of a shortage of parts and equipment.—22 March, 1945.

19th Bombardment Group (VH)
20th Air Force

Despite extremely adverse weather conditions which made it impossible to pick up a fighter escort, the 19th Bomb Group flew 1,500 miles to drop heavy loads of incendiaries on the industrial area of Kobe. During the mission the B-29 formations suffered a total of 122 fighter attacks as well as heavy and accurate flak barrages by massed ground defenses. Sixteen bombers were damaged by the flak, but the flyers pressed on to their primary target and made the hazardous return to their base on Guam.—5 June 1945.

6th Bombardment Group (VH)
20th Air Force

Thirty-six hours after a maximum effort mission in which numerous of its aircraft were damaged, the 6th Bombardment Group was alerted for an attack on the last remaining strategically valuable industrial section of Tokyo. Maintenance crews readied 27 B-29s by take-off time. Attacking first after the pathfinders the aircraft were picked up by searchlights and clearly silhouetted from the initial point through the target area. Anti-aircraft, automatic weapons, rockets, 41 night fighters and 50 suicide planes caused the loss of three B-29s and heavy damage to 14. Gunners destroyed eight and damaged three enemy intercepters.—24 May 1945.

40th Bombardment Group (VH)
20th Air Force

Within nine days the 40th Bombardment Group (VH) conducted three maximum-effort strikes against major Japanese installations. The first strike was made on 5 May against the Hiro Naval Factory, Kure, Japan. Seventy per cent of this aircraft engine and frame manufacturing installation was destroyed. Striking again on 10 May the 40th contributed to the 90 per cent destruction of the Oshima Oil Storage facilities. Again on 14 May the Group participated in a daylight strike against Nogoya, bringing to 9.2 square miles the total area destroyed in that industrial city. All these missions were daylight strikes conducted without fighter escort.—5-14 May 1945.

505th Bombardment Group (VH)
20th Air Force

Impeded by headwinds of 195 mph on the upwind bomb run after a long flight over enemy-controlled territory, the 505th Bombardment Group (VH) bombed and greatly damaged the Akajima Aircraft Company's important Ota plant, a factory which produced 40 per cent of the Japanese fighter planes. Under continuous enemy attack by 75 interceptors, the group chalked up three kills, six probables and three damaged. With 50 per cent of the returning B-29s damaged, the 505th Bombardment Group (VH) was faced with a long over-water flight, rapidly diminishing gasoline supply and landings at the home base scheduled late at night.—10 February 1945.

444th Bombardment Group (VH)
20th Air Force

Although handicapped by inadequate personnel and facilities, almost immediately upon arrival at their Marianas base the 444th made a maximum-effort strike against the Oil Storage Installation at Oshima, Japan. This installation having been virtually destroyed, an estimated 2,000,000 barrels of oil storage capacity was denied to the Japanese. The following day, 11 May the Group bombed the Kawanishi Aircraft Plant near Kobe and left it in ruins. On 14 May the 444th participated in a major-effort daylight incendiary attack against the center of Japanese aircraft production. These were daylight missions flown without fighter escort against heavily defended targets.—10-14 May 1945.

GERMAN ROCKETEERS

(Continued from Page 26)

passes through radar sensing areas with such rapidity only a flash is made on the plotting boards. Average time of flight over a ground range of 250 miles is four to five minutes.

Briefly, the V-2 is a streamlined projectile 46 feet long weighing 12.2 tons. Eight tons of fuel, alcohol and liquid oxygen are driven through the jets in approximately 60 seconds by means of two separate centrifugal pumps driven in turn by a steam turbine operating on concentrated calcium permanganate and hydrogen peroxide in the fuel. It develops a maximum thrust of 68,500 pounds for 65 seconds, giving the rocket a maximum speed of 5,000 feet per second. After the power is cut, the rocket follows the parabolic path of a projectile.

More than 12,000 persons were engaged in the V-2 project in Germany, including 1,500 scientists, engineers and technicians and 8,000 special workers. During 1944, 7,500 V-2s were produced and during the first three months of 1945, 2,500 were made. Of the V-2s tested, about one-fourth proved to be failures, either because of mishandling in launching or defects of construction. Many technical difficulties peculiar to the field of ballistics and aerodynamics were encountered in the early stages of V-2 development, but in designing, producing and using it the Germans showed themselves to be well in advance of any other nation.

No discussion on guided missiles, however cursory, can fail to note the economic aspects of this type of warfare. On this score there are still other lessons to be learned from the Germans. Future wars will undoubtedly follow something of the pattern set by the V-weapons not only because it has been proved that sending guided missiles against an enemy is the most practicable and effective method of loosing destruction upon him, but also because it is the cheapest kind of warfare. The entire V-2 program, for instance, is estimated to have cost the Germans only $21,000,000. And considerably cheaper than that by far are the V-1s.

In comparison to the 12,000 man-hours necessary for the manufacture of one Spitfire, for example, only 800 to 900 man-hours per bomb were required in the contruction of the V-1 buzz-bomb. One flying bomb in effect requires about 1/13th of the production effort required for a single-engine fighter. And the total expenditure of 4,000 flying bombs per month consumed only about 1.3 percent of total Axis requirements of aviation fuel.

Comparative studies have been made which indicate that the V-1s cost to the Allies in terms of man-hours required for countermeasures such as bombing attacks, fighter interception, anti-aircraft, balloons, etc., as well as the actual losses such as repairs to damaged houses, loss of production and absenteeism, was almost four times as great as the cost of the entire flying bomb program to the Germans.

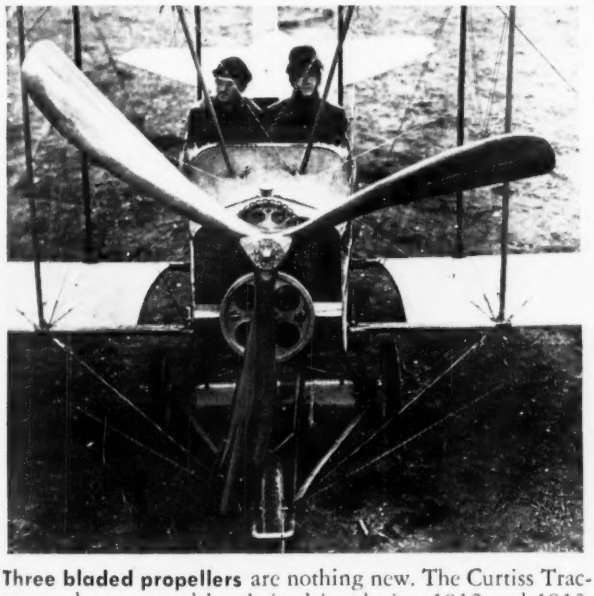
Between June 13 and Sept. 3, 1944 a total of 2,354 V-1s landed in greater London, killing 5,476 persons, destroying 23,000 buildings and homes and damaging one million more. In addition, 1,482 Allied flyers lost their lives bombarding the launching sites. In all the buzz-bombs were responsible for deaths equal to about 1/10th the total number of Britons who lost their lives by *all* of the conventional aerial bombings—and this in less than three months and at very little cost in lives to the Germans.

This points up emphatically the nature of the next aerial conflict. Even now, more than a year after V-E Day it is still frightening to image what *might have* happened had we not halted Germany when we did. We now know that it was later than we thought. It is not enough to concede that the call was close unless, in that closeness, we have learned one of the war's most valuable lessons. ☆

The newest and largest AAF cargo plane, Douglas C-74, has a gross weight of 145,000 pounds and a wing span of 173 feet.

The Album PROPELLERS

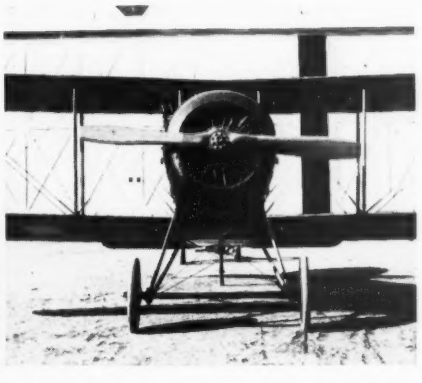
Designed after small boat screws, this early conventional propeller pulled the Etrich Monoplane of 1911 vintage through French skies. The pilot shown here was only kidding. His fancy Sunday duds would have been a mess even if he sat down to fly.



Three bladed propellers are nothing new. The Curtiss Tractor used one turned by chain drive during 1912 and 1913.

This Curtiss job was the first tractor biplane purchased by the government. It sported a massive wooden propeller.

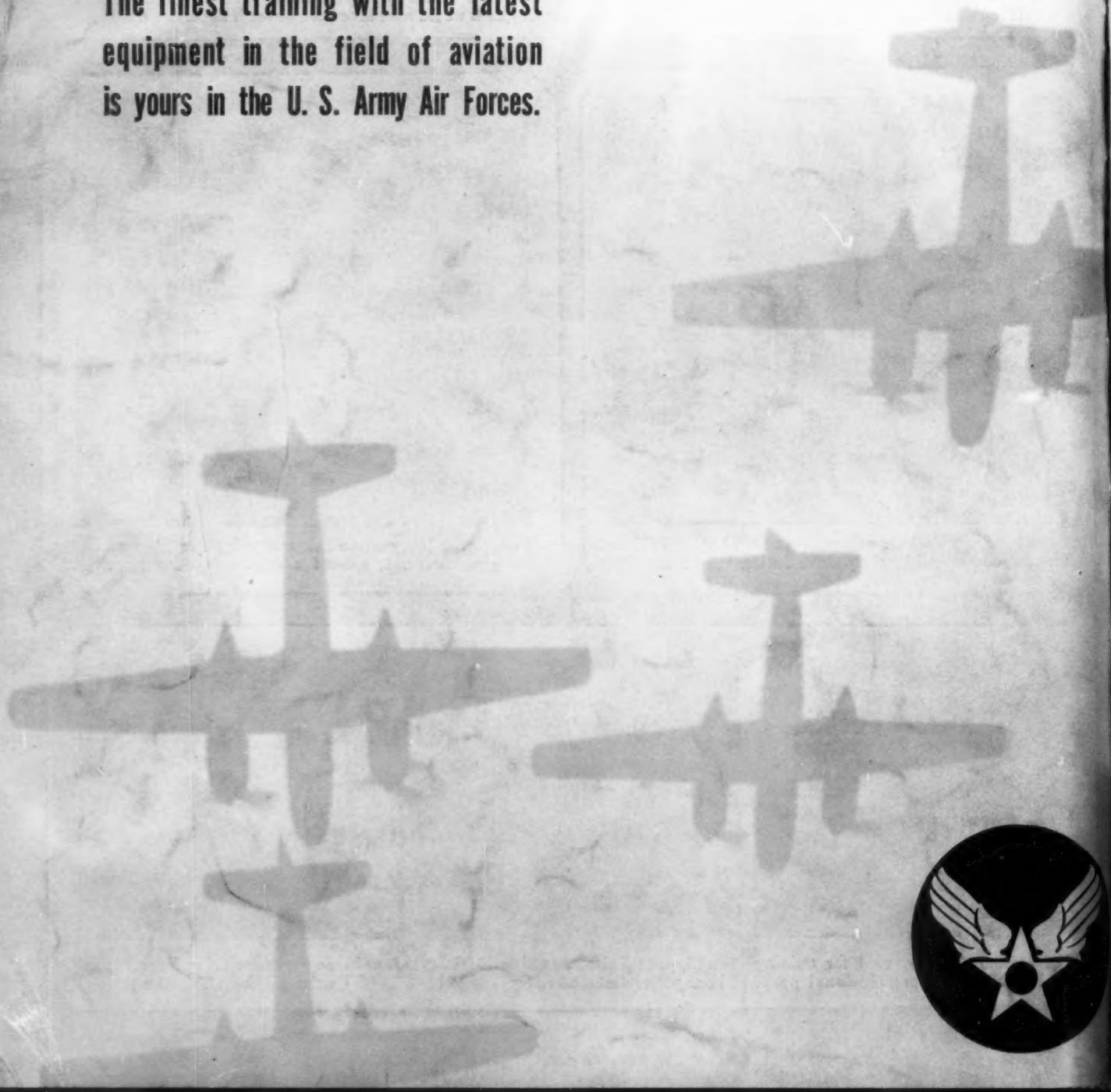
The Morane Roulier, used for training in France, had a conventional prop.



This clipped tip airscrew and an 80 HP Le-Rhone pulled the Standard Scout of 1918.

Four blade props are old stuff too, as this 1916 Curtiss Kirkham Triplane proves.

MAKE A CAREER OF

AVIATION!

The finest training with the latest equipment in the field of aviation is yours in the U. S. Army Air Forces.